Guidelines:

- This Request Submission Form should be completed by the organisation requesting technical assistance from the Climate Technology Centre & Network (CTCN) in collaboration with the National Designated Entity (NDE) of the country in question
- The Form must be signed by the NDE. Please see updated contact list of NDEs here: http://unfccc.int/ttclear/support/national-designated-entity.html
- The Form can be submitted as a Word file containing a digital signature or as a signed and scanned PDF file in combination with an un-signed Word file
- For requests submitted by multiple countries, all the NDEs of the respective countries shall sign identical Forms before official submission to the CTCN
- NDEs have the opportunity to submit CTCN requests in collaboration with National Designated Authorities (NDAs) for the Green Climate Fund (GCF) if targeting the GCF Readiness Programme.

Requesting country or countries:	Somalia
Request title:	Improving Agricultural Productivity Through Solar Irrigation in Somalia
NDE	Zakarie Ismael Sheikh National Designated Entity- NDE Ministry of Communications and Technology, Somalia zakarie@moct.gov.so
Request Applicant:	Ministry of Agriculture and Irrigation (MoAI) Contact Person: Dirie Abdi Mohamed Director, Agricultural Technology and Innovation Email: mti.dept@moa.gov.so Address: KM4, Mogadishu,Somalia

Climate objective:

☐ Adaptation to climate change
☐ Mitigation of climate change
☒ Combination of adaptation and mitigation of climate change

Geographical scope:

☐ Community level

☒ Sub-national

☐ National

☐ Multi-country

Federal Member States: Hirshabelle, Jubaland, South West State and Galmudug

Galmudug State: Adado District

Hirshabelle State: Jowhar District
Southwest State: Afgoye District
Jubaland State: Kismayo District

Problem statement related to climate change (up to one page):

Somalia's agricultural sector, which employs an estimated 60–70% of the population and contributes approximately 25% of GDP, faces an escalating climate crisis that is systematically undermining food security and rural livelihoods. The country is experiencing increasingly erratic rainfall, prolonged droughts, and intensifying flood events trends confirmed by IPCC projections for the Horn of Africa. Between 2017 and 2023, Somalia experienced five consecutive below-average rainy seasons, culminating in a near-famine emergency affecting over 8 million people.

Smallholder farmers in the Shabelle and Juba River basins Somalia's primary agricultural zones remain overwhelmingly dependent on rain-fed farming and gravity-fed traditional irrigation from river diversions. These systems are highly vulnerable to climate variability: when rainfall fails or river levels drop, crops fail entirely. Groundwater resources in many agricultural districts remain largely untapped due to the absence of affordable and reliable pumping technology.

Solar-Powered Irrigation Systems (SPIS) offer a transformative, climate-resilient alternative. However, their adoption in Somalia remains negligible due to: (i) absence of baseline data on groundwater availability and solar irradiation potential at community level; (ii) lack of trained local technicians for installation and maintenance; (iii) high upfront capital costs and absence of financing models including cooperative sharing arrangements; (iv) limited awareness among farming communities, particularly women, of the technology's benefits and operation; and (v) the absence of operational demonstration sites that build trust and provide learning opportunities.

The nexus of climate change impacts and these structural technology barriers is driving food insecurity, rural poverty, and displacement particularly in Jubaland, Galmudug, South West State, and Hirshabelle making climate-smart irrigation a national priority.

Past and on-going efforts to address the problem (up to half a page):

The Federal Government of Somalia and development partners have undertaken a number of relevant initiatives:

- Somalia Farmer Registration Platform (SOFAREP): MoAI has developed and is scaling a digital farmer registration platform providing geo-referenced data on farming households, crops, and land parcels across target districts. SPIS deployment will be integrated with SOFAREP to anchor a geo-referenced opportunity database.
- FAO Emergency Livelihood and Food Security Interventions: FAO has supported gravity-fed canal rehabilitation and water harvesting in Shabelle and Juba basins. However, these interventions have not addressed solar-powered groundwater irrigation.

- World Bank Somalia: Inclusive and Resilient Livelihoods Project: Provides cash transfers and livelihood support in target districts but does not include renewable energy-based irrigation technology components.
- GIZ Rural Resilience Programme: Has piloted small-scale solar water pumping in selected communities in Somaliland, providing limited proof-of-concept data applicable to the south-central regions.
- Somalia NDC Implementation: The Federal Government has prioritised climate-smart agriculture and irrigation development in its updated NDC (2025) and National Adaptation Plan (NAP) framework; however, implementation of solar irrigation at scale remains a gap.

These efforts underscore national commitment but reveal a clear gap: no comprehensive agro-hydrological baseline, no systematic technician training pipeline, and no formal SPIS demonstration network exist for the target Federal Member States.

Specific technology[1] barriers (up to one page):

The following technology barriers hinder Somalia's ability to deploy SPIS at scale:

- **Barrier 1 Absence of Technology Benchmarking Data:** No systematic comparative assessment of SPIS technology types (submersible solar pumps, drip-integrated solar systems, solar borehole systems) exists for Somali agro-ecological conditions. Decision-makers lack cost-benefit analyses and suitability mapping to guide investment.
- **Barrier 2 Lack of Agro-Hydrological Baseline**: Groundwater availability, aquifer depth, recharge rates, crop water requirements, and solar irradiation potential have not been mapped at community level in target districts. Without this data, appropriate technology selection and site-specific system design are impossible.
- **Barrier 3 Critically Low Technical Capacity:** Somalia has very few trained SPIS technicians outside Mogadishu. Rural communities lack local capacity for installation, operation, and maintenance, resulting in high system failure rates and aid dependency.
- **Barrier 4 Low Community Awareness:** Rural farming communities, particularly women-led groups and food-insecure households, have limited awareness of SPIS technology, its benefits, affordability models (including cooperative sharing), and operational requirements.
- **Barrier 5 Absence of Demonstration Infrastructure: No** operational SPIS demonstration sites exist in Jubaland, Galmudug, South West State and Hirshabelle. This absence prevents technology learning, discourages private investment, and limits replication.

CTCN technical assistance will directly address all five barriers through evidence generation, capacity building, awareness raising, and demonstration.

Contribution to Programme of Work 2023-2027:

As per 3rd Programme of Work of the CTCN[2], please indicate the system transformation area, key enablers and cross-sectoral themes related to the request:

System transformation areas (mandatory)

[1] *"**any equipment, techniques, practical knowledge and skills** needed for reducing greenhouse gas emissions and adapting to climate change" (Special Report on Technology Transfer, IPCC, 2000)*

[2] https://www.ctc-n.org/resources/ctcn-third-programme-work-2023-2027

☒ Water-Energy-Food Nexus ☐ Sustainable Mobility ☒ Energy Systems ☐ Buildings and Infrastructure

☐ Business and Industry

Key enablers (optional)

☒ National Systems of Innovation ☒ Digitalization

Cross-sectoral themes (optional)

☒ Gender ☐ Youth ☐ Indigenous Peoples

Sectors:

Please indicate the main sectors related to the request:

☐ Coastal zones ☐ Early Warning and Environmental Assessment ☐ Human Health ☐ Infrastructure and Urban planning

☐ Marine and Fisheries ☒ Water ☒ Agriculture ☐ Carbon fixation

☐ Energy Efficiency ☐ Forestry ☐ Industry ☒ Renewable energy

☐ Transport ☐ Waste management

Please add other relevant sectors:

Technical assistance requested (up to one page):

Overall Objective:

To enhance the climate resilience and agricultural productivity of smallholder farming communities in Jubaland, South West State, Galmudug State and Hirshabelle through the evidence-based, inclusive, and sustainable deployment of Solar-Powered Irrigation Systems (SPIS), supported by robust local technical capacity, community awareness, and cooperative sharing models.

Anticipated Activities:

Activity 1: Technology Needs Assessment and Benchmarking:

Conduct a comprehensive technology needs assessment to benchmark solar-powered irrigation systems suitable for Somalia's smallholder farming scale, water source conditions, and agro-ecological zones. Systems assessed will include submersible solar pumps, drip-integrated solar systems, and solar borehole systems, with analysis of their respective cost-benefits and suitability for target districts in Jubaland, Galmudug, South West State, and Hirshabelle.

Activity 2: Agro-Hydrological Field Assessment and Opportunity Database:

Develop a detailed site-specific agro-hydrological assessment workplan and conduct field assessments in 50 target communities across the Shabelle and Juba basin agricultural districts. Data collection will cover groundwater availability, solar irradiation potential, crop water requirements, and soil suitability. Outputs will be consolidated into a geo-referenced SPIS Opportunity Database integrated with the SOFAREP farmer registration platform.

Activity 3: Capacity Building and Technician Certification:

Develop a capacity building framework for MoAI engineers, extension agents, and rural SPIS technicians. Deliver a training-of-trainers programme (minimum 60 participants, at least 35% women) and certify 120 SPIS installation and maintenance technicians in target districts. This programme is designed to reduce reliance on Mogadishu-based technical support and foster long-term local sustainability.

Activity 4: Community Awareness and Mobilisation:

Implement awareness and community mobilisation campaigns on solar irrigation benefits and cooperative sharing models for rural farming communities in target districts. Campaigns will use community radio, farmer field schools, and MoAI extension networks to reach farmers in the Somali language.

Activity 5: SPIS Pilot Demonstration Sites:

Establish 12 operational SPIS pilot demonstration sites across target regions (3 per Federal Member State, Jubaland, Southwest, Galmudug and Hirshabelle), prioritising women-led farming groups and food-insecure communities. Sites will demonstrate technology performance, anchor the trained technician network, and serve as hubs for building solar irrigation cooperatives.

Activity 6: Developing a National Solar Irrigation Systems Strategy and Action Plan:

Develop a comprehensive National Solar Irrigation Systems (SPIS) Strategy and Action Plan to guide the scale-up of solar-powered irrigation across Somalia beyond the pilot phase. Drawing on evidence generated through Activities 1 to 5, the strategy will define a long-term national vision, investment roadmap, institutional responsibilities, regulatory framework, financing mechanisms (including cooperative and public-private partnership models), and monitoring and evaluation indicators. The Action Plan will include sequenced implementation milestones aligned with Somalia's NDC, NAP, and NDP priorities, and will identify pathways for mobilising domestic and international climate finance. Stakeholder validation workshops will be conducted in each Federal Member State to ensure the strategy reflects sub-national realities and is endorsed by all relevant government entities, farmers' organisations, and development partners.

Anticipated Products:

- SPIS Technology Benchmarking Report with cost-benefit analysis and suitability matrix for

Somalia's agro-ecological zones

- Geo-referenced SPIS Opportunity Database integrated with SOFAREP
- Capacity Building Framework and Training-of-Trainers Curriculum
- 120 certified SPIS installation and maintenance technicians
- Community awareness campaign materials in Somali language
- 12 operational SPIS pilot demonstration sites with performance monitoring reports
- Solar irrigation cooperative establishment guide and replication toolkit

National Solar Irrigation Systems Strategy and Action Plan, endorsed by Federal and Federal Member State governments.

Expected timeframe:

Expected Duration: 18 months

The 18-month duration is proposed to accommodate the multi-district scope (50 communities across Jubaland, Galmudug, South West State, and Hirshabelle), seasonal agricultural calendars, technician certification timelines, and SPIS site establishment requirements. Phase 1 (Months 1 to 6): Technology assessment and field surveys. Phase 2 (Months 4 to 12): Capacity building and awareness campaigns. Phase 3 (Months 8 to 18): Demonstration site establishment and cooperative formation. Phase 4 (Months 12 to 18): National Solar Irrigation Systems Strategy and Action Plan development, stakeholder validation, and government endorsement.

Anticipated gender and other co-benefits from the technical assistance:

Gender Co-Benefits:

- A minimum 35% women participation target across the training-of-trainers programme ensures women become certified SPIS technicians and extension agents.
- Demonstration sites will prioritise women-led farming groups in all three Federal Member States.
- Community mobilisation campaigns will specifically address women farmers using community radio and farmer field schools in Somali language.
- Cooperative irrigation structures will include women's governance roles, reducing the burden of water collection on women and girls.

Other Co-Benefits:

- Food Security: SPIS deployment extends crop production beyond rain-fed seasons, directly improving household food security for target communities.
- Economic: Reduced input costs, increased yield, and cooperative sharing of SPIS capital costs improve farm income and rural economic resilience.
- Environmental: Solar-powered pumping displaces diesel generators, reducing local air pollution and greenhouse gas emissions.

Social: Local technician certification reduces community dependence on external support and builds long-term institutional capacity within target districts.

Anticipated follow-up activities after this technical assistance are completed:

Following completion of the CTCN technical assistance, the following activities are anticipated:

- MoAI will use the SPIS Opportunity Database and benchmarking report to mobilise financing from

the Green Climate Fund, Islamic Development Bank, and bilateral donors for scale-up across all Federal Member States.

- The 120 certified SPIS technicians will form the backbone of a national SPIS installation and maintenance network managed through MoAI extension services.
- The 12 pilot demonstration sites will be transitioned into community-owned cooperative irrigation hubs, with cooperative governance frameworks supported by the replication toolkit.
- The SOFAREP-integrated SPIS Opportunity Database will be operationalised by MoAI as a national planning tool for all future irrigation investment decisions.

CTCN outputs will inform the update of Somalia's NAP and inform the next NDC revision, embedding SPIS as a priority climate technology for Somalia's agricultural sector. The National Solar Irrigation Systems Strategy and Action Plan produced under Activity 6 will serve as the primary vehicle for mobilising long-term domestic budget allocations and international climate finance, and will be institutionalised within MoAI as a living policy instrument subject to five-year reviews.

Key stakeholders:

Stakeholders	Role to support the implementation of the technical assistance
Ministry of Environment and Climate Change (MoECC) National Designated Entity	NDE signatory; national climate policy oversight; coordination with UNFCCC and CTCN; monitoring and evaluation reporting.
Ministry of Agriculture and Irrigation (MoAI) Request Applicant	Lead implementing agency; coordination of field assessments, capacity building, and demonstration sites; management of SPIS technician network and strategy development.
Jubaland Federal Member State Ministry of Agriculture	Sub-national implementation in Kismayo district; identification of target communities; facilitating field access and community engagement.
South West State Ministry of Agriculture	Sub-national implementation in Afgoye district; community mobilisation support; local extension services coordination.
Hirshabelle Ministry of Agriculture	Sub-national implementation in Jowhar district; logistical support for field surveys and training events.
FAO Somalia	Technical advisory support on agro-hydrological assessment; alignment with existing food security data and livelihoods programming.
Private Sector SPIS Suppliers and Installers	Technical input to technology benchmarking; participation in demonstration site installation; potential suppliers for cooperative procurement.
Women Farmer Cooperatives and Community-Based Organisations	Participation in training, awareness campaigns, and cooperative establishment; primary beneficiaries of demonstration sites; governance of community SPIS hubs.
Galmudug Ministry of Agriculture	Sub-national implementation in Adado district; logistical support for field surveys and training events.

Alignment with national priorities (up to 2000 characters including spaces):

This request is fully consistent with Somalia's national climate and development priorities. Somalia's updated Nationally Determined Contribution (2021) explicitly prioritises solar-powered irrigation and climate-smart agriculture as adaptation and mitigation measures, targeting a 30% improvement in agricultural water use efficiency. The National Adaptation Plan (2022) identifies smallholder irrigation and renewable energy for agriculture as priority pathways for the Shabelle and Juba basins. The Technology Needs Assessment identified solar irrigation systems as a priority climate technology, with the associated Technology Action Plan recommending capacity building, demonstration infrastructure, and policy frameworks for SPIS deployment. The National Development Plan 9 (2020–2024) prioritises irrigation-led agricultural productivity under Pillar 3. The GCF Country Programme includes solar irrigation and climate-smart agriculture as investment priorities, and this request is structured for GCF Readiness co-financing. Activity 6 of this request will produce a National Solar Irrigation Systems Strategy and Action Plan directly operationalising these frameworks. No Long-term Low Emission Development Strategy has been formally adopted; however, this request contributes to its foundations by displacing diesel-based irrigation with renewable solar energy.

Reference document (please include date of document)	**Extract** (please include chapter, page number, etc.).
Nationally Determined Contribution (NDC 3.0) Somalia, 2025	Somalia's updated NDC explicitly identifies climate-smart agriculture and solar-powered irrigation as priority adaptation and mitigation measures. The NDC targets a 30% increase in agricultural water use efficiency and reduction of diesel-based irrigation. This request directly supports NDC agricultural adaptation targets (Chapter 3, Agriculture Sector, pages 18–22).
Technology Needs Assessment Somalia (2022)	Solar irrigation systems were identified as a priority technology in Somalia's TNA, with a Technology Action Plan recommending capacity building for installation and maintenance and the development of demonstration infrastructure.
National Adaptation Plans (2026-2030)	The NAP identifies smallholder irrigation development and renewable energy for agriculture as priority adaptation pathways for the Shabelle and Juba basin regions, referencing groundwater development and technology transfer gaps (Section 4.2, pages 34–38).
GCF Country Programme (2023)	The GCF Country Programme includes solar irrigation and climate-smart agriculture as investment priorities. This request is aligned for potential GCF Readiness Programme co-financing.
Long-term Low Emission Development Strategies	No Long-term Low Emission Development Strategy has been formally adopted.

Development of the request (up to 2000 characters including spaces):

This request was initiated by the Ministry of Agriculture and Irrigation (MoAI) following consultations with Federal Member State ministries of agriculture, FAO Somalia, and smallholder farming community representatives in Kismayo, Jowhar, and Afgoye districts. The identification of solar irrigation as a priority technology gap emerged from joint field assessments conducted in 2023–2024 that revealed the absence of reliable groundwater data and the near-total lack of trained SPIS technicians outside

Mogadishu.

The NDE, MoECC, was engaged at the outset of request formulation and has co-developed the scope of activities with MoAI. A national stakeholder consultation workshop was convened in Mogadishu in Q1 2025 involving representatives from the three Federal Member States, women farmer cooperatives, private sector suppliers, and FAO. Workshop participants validated the problem statement, endorsed the proposed activities, and confirmed the 50-community target scope.

The request has been reviewed by MoECC's Climate Change Directorate and approved for submission to the CTCN as a priority technical assistance request aligned with Somalia's NDC, NAP, and NDP-9.

Background documents and other information relevant for the request:

- Somalia Updated NDC (2021) Federal Government of Somalia, Ministry of Environment and Climate Change
- Somalia National Adaptation Plan (2022)
- Technology Needs Assessment Somalia (TNA Report, available via UNFCCC TT:CLEAR platform)
- FAO Somalia: Agricultural Livelihoods Sector Assessment 2023
- SOFAREP Platform Documentation Ministry of Agriculture and Irrigation
- GCF Somalia Country Programme Document
- Somalia Irrigation Policy and Strategy Framework (Ministry of Agriculture and Irrigation, 2019) relevant reference for the National Solar Irrigation Systems Strategy and Action Plan development
- FAO SPIS Toolbox: Solar-Powered Irrigation Systems (FAO, 2018) methodological reference for technology benchmarking and strategy development (https://www.fao.org/3/i9047en/I9047EN.pdf)
- CTCN Third Programme of Work 2023–2027: https://www.ctc-n.org/resources/ctcn-third-programme-work-2023-2027

OPTIONAL: Linkages to Green Climate Fund Readiness and Preparatory Support

The CTCN is collaborating with the GCF in order to facilitate access to environmentally sound technologies that address climate change and its effects, including through the provision of readiness and preparatory support delivered directly to countries through their GCF NDA. These actions are in line with the guidance of the GCF Board (Decision B.14/02) and the UNFCCC, particularly paragraphs 4 and 7 of 14/CP.22 and paragraph 4, 7 and 8 of 14/CP.24 that addresses Linkages between the Technology and the Financial Mechanisms[3].

The CTCN is therefore implementing some of its technical assistance using GCF readiness funds accessed via the country's NDA. Any application for GCF support, including the amount of support provided, is subject to the terms and conditions of the GCF and should be developed in conjunction with the NDA.

Please indicate whether this request has been identified as preliminarily eligible by the NDA to be considered for readiness support from the GCF.

☐ Initial engagement: The GCF NDA of the requesting country has been engaged in the design of this

[3] Please see: https://unfccc.int/files/meetings/marrakech_nov_2016/application/pdf/auv_cop22_i8b_tm_fm.pdf

request and the NDA will be involved in the further process leading to an official agreement for accessing GCF readiness support.

☐ Advanced engagement (preferred): The GCF NDA of the requesting country has been directly involved in the design of this request and is a co-signer of this request, the signature indicating provisional agreement to use readiness national funds to support the implementation of the technical assistance.

NDA name:

Date:

Signature:

Monitoring and impact of the assistance:

By signing this request, the NDE affirms that processes are in place in Somalia to monitor and evaluate the technical assistance provided by the CTCN. The NDE understands that these processes will be explicitly identified in the CTCN Response Plan and used to monitor implementation following standard CTCN procedures. The NDE commits to active engagement in regular project steering meetings and to supporting CTCN efforts to measure short, medium, and long-term impacts of the assistance, including completing NDE feedback and post-implementation forms.

Signature:

NDE name:	Zakarie Ismael Sheikh
Date:	23/05/2026
Signature:	

THE COMPLETED FORM SHALL BE SENT TO THE CTCN@UNEP.ORG

The CTCN is available to answer all questions and provide guidance on the application process.