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:	Republic of Botswana
Request title:	Technical assistance to strengthen climate resilient clean cooking and energy security through scalable biogas technology deployment in underserved districts of Botswana
NDE	Botswana Institute for Technology Research and Innovation (BITRI), Innocent Basupi, Senior Researcher, ibasupi@bitri.co.bw
Request Applicant:	Ministry of Minerals and Energy, Department of Energy, Principal Energy Engineer jjmolenga@gov.bw

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

If the request is at a sub-national or multi-country level, please describe specific geographical areas (provinces, states, countries, regions, etc.).

The request targets underserved districts including Letlhakeng, Tsabong, Tonota, Tutume and Bobonong, where reliance on biomass fuels remains high and access to sustainable clean cooking solutions is limited and not adequately covered under previous biogas pilot implementation phases.

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

Botswana is increasingly experiencing climate change impacts characterised by rising temperatures, erratic rainfall patterns, and prolonged drought cycles. These climatic pressures are intensifying vulnerabilities in energy access, agriculture, waste management, and ecosystem sustainability. Botswana's semi-arid climatic conditions place rural and peri-urban communities at particular risk of climate induced resource scarcity and energy insecurity.

Despite progress in electrification, a significant proportion of households continue to depend on traditional biomass fuels such as firewood and charcoal for cooking. National statistics indicate that approximately 33.9 percent of households still rely on biomass for cooking, with Botswana targeting 90 percent clean cooking access by 2030. This dependence contributes to deforestation, land degradation, and greenhouse gas emissions while exposing households to harmful indoor air pollution. Women and children are disproportionately affected due to their traditional roles in cooking and fuel collection.

Climate change has also increased pressure on Botswana's livestock and agricultural sectors, leading to increased organic waste generation that remains largely underutilised. These organic waste streams present opportunities for renewable energy generation through anaerobic digestion. However, Botswana lacks scalable waste to energy deployment mechanisms capable of converting this resource into sustainable clean cooking solutions.

Botswana's energy system remains vulnerable due to heavy reliance on coal-based electricity generation and costly electricity imports. National energy planning prioritises diversification of the energy mix and expansion of renewable energy technologies to strengthen energy security and reduce carbon intensity. Biogas technology provides a strategic solution by converting organic waste into renewable energy and organic fertiliser, thereby reducing emissions, improving waste management, supporting agricultural productivity, and strengthening climate resilience.

The proposed request therefore seeks to support Botswana in deploying climate resilient biogas technologies to address clean cooking access, renewable energy generation, and waste management while contributing to national climate mitigation and adaptation objectives.

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

The Government of Botswana has implemented several initiatives to support renewable energy deployment and climate mitigation. The National Energy Policy promotes diversification of energy sources and utilisation of indigenous renewable energy resources to support sustainable low carbon development. Botswana's National Energy Compact prioritises universal access to clean cooking and sustainable energy services by 2030.

Botswana has introduced biogas technologies through pilot projects targeting households, schools, and institutions in partnership with development partners. These initiatives demonstrated the potential of

anaerobic digestion to support renewable energy generation and sustainable waste management.

Botswana is also developing a National Clean Cooking Strategy aimed at transitioning households from traditional biomass fuels to modern and sustainable cooking technologies. The Biogas Project Phase II was introduced to expand previous pilot interventions and increase clean cooking access in rural districts. However, implementation challenges, including financial limitations and technological uncertainties, have limited full programme rollout and comprehensive performance evaluation.

These initiatives demonstrate strong national commitment while highlighting the need for technical assistance to support technology selection, scalability, and long-term sustainability of biogas deployment.

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

Botswana faces several technological and institutional barriers that limit large scale deployment of biogas technologies.

The high capital cost of biogas digester technologies remains a major constraint. Limited local manufacturing capacity increases reliance on imported equipment, raising installation costs and limiting affordability for rural households. The absence of cost optimisation models and financing mechanisms further restricts technology uptake.

Botswana also lacks comparative technical evidence assessing performance of different biogas digester technologies under local climatic conditions. Extreme temperatures, water scarcity, and variable feedstock availability influence digester performance and operational reliability. Existing programmes have largely relied on limited technology designs without evaluating prefabricated and modular systems that may provide improved scalability for household clean cooking.

Monitoring and performance verification systems remain underdeveloped. Limited availability of trained inspectors and monitoring tools restricts functionality tracking and sustainability assessment. This reduces the ability to generate operational data required for evidence-based policy development and technical standardisation.

Feedstock management represents another critical barrier. Botswana currently lacks structured frameworks to guide feedstock supply chain planning, waste collection logistics, and sustainability monitoring. Inconsistent feedstock availability has contributed to system underperformance in some installations.

Additionally, Biogas Project Phase II remains partially implemented due to financial constraints. This has limited opportunities to conduct technology comparisons, operational optimisation, and institutional capacity strengthening. The absence of comprehensive technical evidence and monitoring frameworks continues to constrain national scale up of biogas deployment.
The requested technical assistance will address these barriers by generating performance evidence, strengthening monitoring frameworks, supporting feedstock management planning, and building national technical capacity.

[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)*

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)

- ☐ 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):

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

Overall objective

To strengthen Botswana's institutional, technical, and operational capacity to deploy climate-resilient biogas technologies. This includes enhancing national technical standards, improving technology selection processes, and enabling evidence-based scale-up of decentralized renewable energy and clean cooking solutions across diverse climatic and socio-economic settings.

Anticipated groups of activities

1. Comparative Technology Assessment: Conduct assessments of conventional versus prefabricated biogas digester technologies to determine suitability for Botswana's specific climatic conditions.
2. Pilot Demonstration & Optimization: Implement pilot installations in underserved districts (Letlhakeng, Tsabong, Tonota, Tutume, Bobonong) to generate operational data, evaluate durability, and test user adoption. This includes optimizing existing conventional digesters to strengthen learning outcomes.
3. Standardization & Guidelines: Develop national technical guidelines covering system design, installation, feedstock management, and maintenance standards.
4. Monitoring Framework Development: Create comprehensive monitoring and evaluation frameworks to track system performance and long-term sustainability.
5. Capacity Building: Execute training programs for local technicians, inspectors, and implementing agencies to ensure local skills transfer.

Preliminary indicative budgeting suggests that pilot implementation and technology validation activities may require approximately USD 100,000 per district. This estimate covers comparative technology demonstration, performance monitoring systems, optimization of existing installations, training, and development of technical standards. Detailed cost modelling and financial structuring will be undertaken during the technical assistance to refine district-specific investment requirements and scalability pathways.

Anticipated products

1. Performance Reports: Comparative analysis of efficiency, lifecycle costs, and durability of conventional vs. prefabricated digesters.
2. National Guidelines: Comprehensive standards for deployment, feedstock management, and waste collection logistics.
3. Monitoring and Evaluation Frameworks: Inspection manuals, performance verification tools, and reporting templates.
4. Training Curriculum: Materials for installation, safety, and maintenance training for technicians and institutions.
5. Policy Roadmaps: Recommendations for financing mechanisms, regulatory standards, and integration into national energy programs.

Expected timeframe:

The expected duration of the technical assistance is 15 months.

Anticipated gender and other co-benefits from technical assistance:

1. Gender Mainstreaming: The assistance will significantly reduce the time women and girls spend collecting firewood, allowing for productive economic activities, while improving health

outcomes by reducing exposure to indoor air pollution.
2. Economic & Social: Local youth will gain employment opportunities through skills development in system installation and maintenance. Household productivity and well-being will improve through reliable energy access.
3. Environmental: The project supports circular economy practices by converting waste into organic fertilizer for climate-resilient agriculture, while simultaneously reducing deforestation and greenhouse gas emissions.

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

Outputs from the technical assistance will be integrated into national clean cooking and renewable energy scale up programmes and will guide expansion of biogas deployment in both household and institutional applications. Technical guidelines, monitoring tools, and performance data will support refinement of national standards, programme design, and technology selection processes. The results are expected to strengthen future investment planning, support mobilisation of domestic and international climate finance, and facilitate replication of successful deployment models across additional districts. The assistance will also support development of long-term implementation frameworks, strengthen partnerships with private sector technology providers, and enhance national capacity to sustain and scale biogas programmes beyond the technical assistance period. The results are expected to strengthen Botswana's long term energy transition strategy.

Potential financing avenues for scaling biogas deployment beyond the technical assistance phase include mobilization of national renewable energy allocations, Green Climate Fund readiness and investment windows, climate investment facilities, development partner grants, public–private partnerships with local technology providers, and results-based climate finance mechanisms including carbon markets. The technical assistance will support identification of the most appropriate blended finance structures to ensure long-term sustainability and affordability.

Key stakeholders:

Stakeholders	**Role to support the implementation of the technical assistance**
National Designated Entity	Overall coordination, approval, and alignment with national climate priorities
Ministry of Minerals and Energy (Department of Energy)	Technical oversight, policy alignment, and implementation support
UNDP Botswana	Technical advisory support and coordination with development partners
District Councils	Community mobilisation, site identification, and local facilitation
Beneficiary communities	Participation in pilots, feedback, and adoption of technologies
Local private sector	Supply, installation, maintenance, and skills transfer
Academic and training institutions	Capacity building and technical training support

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

The request is fully aligned with Botswana's climate and development frameworks:

1. Nationally Determined Contribution (NDC) (2021): Supports commitments to reduce greenhouse gas emissions through renewable energy deployment and waste-to-energy solutions.
2. National Energy Policy (2021): Directly implements objectives to diversify energy sources and utilize indigenous renewable resources.
3. National Energy Compact (2025): Contributes to the specific targets of achieving 90% clean cooking access and 50% renewable energy share by 2030.
4. Integrated Resource Plan (2025): Supports the priority of renewable energy expansion to strengthen energy security and reduce carbon intensity

Reference document (please include date of document)	**Extract** (please include chapter, page number, etc.).
Botswana Updated Nationally Determined Contributions (2021)	Renewable Energy and Clean Cooking sections – Commits Botswana to reducing greenhouse gas emissions through renewable energy deployment, waste to energy solutions, and improved energy access pathways.
Botswana National Energy Compact (2025)	Pillar I: Last Mile Access and Clean Cooking – Establishes Botswana's commitment to achieving 90 percent clean cooking access by 2030 and expanding renewable energy deployment to improve climate resilience and energy security.
National Energy Policy (2021)	Renewable Energy and Biomass and Waste Energy sections – Promote diversification of energy sources, development of renewable energy technologies, sustainable utilisation of indigenous energy resources, and transition towards a low carbon economy.
Revised Integrated Resource Plan (2025)	Renewable Energy Expansion Targets – Prioritises increasing renewable energy contribution to 50 percent of the national energy mix by 2030 to reduce carbon intensity and strengthen national energy security.
Technology Needs Assessment and Technology Action Plan (2023)	Botswana Technology Needs Assessment, Energy Sector Priority technologies include renewable energy and clean cooking solutions

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

The request was initiated by the Department of Energy under the Ministry of Minerals and Energy based on lessons learned from national biogas implementation programmes and ongoing clean cooking initiatives.

Technical consultations were conducted internally within the Department of Energy to identify priority

gaps related to technology performance, scalability, and sustainability under Botswana's climatic conditions. Consultations were also undertaken with development partners, district authorities, and technical stakeholders involved in biogas project implementation.

Background documents and other information relevant to the request:

Relevant documents include Botswana's National Energy Policy (2021), National Energy Compact Revised, Integrated Resource Plan (2025), National Clean Cooking Strategy, Botswana Nationally Determined Contributions, Renewable Energy Strategy, Energy Efficiency Strategy, and implementation reports from previous biogas and clean cooking initiatives. These documents provide the policy and technical foundation upon which this request is based.

This request was not developed through the CTCN Request Incubator.

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 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:

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

Monitoring and impact of the assistance:

By signing this request, I affirm that processes are in place in the country to monitor and evaluate the technical assistance provided by the CTCN. I understand that these processes will be explicitly identified in the CTCN Response Plan and that they will be used in the country to monitor the implementation of the technical assistance following standard CTCN procedures. This includes active engagement as NDE together with the key project proponent / beneficiary in regular project steering meetings.

I understand that, after the completion of the requested assistance, I shall support CTCN efforts to measure the success and effects of the support provided, including its short, medium and long-term impacts in the country. This includes the completion of NDE feedback and post-implementation forms.

Signature:

NDE name:	Innocent Basupi
Date:	03/03/2026
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.