Technical Assistance Response Plan – Terms of Reference (DRAFT)

Country	**Mongolia**
Request ID#	2022000007
Title	Feasibility Study on a combined Heat and Power Supply using Green Hydrogen
NDE	Name: Ms. Narangaravuu A Position: Office for Climate Change Policy Organization: Climate Change Department, Ministry of Environment and Tourism of Mongolia Email: narangaravuu@mne.gov.mn Address: Government Building Ⅱ, United Nations Street 5/2, Ulaanbaatar 15160
Proponent	Name: Ms. Narangaravuu A Position: Office for Climate Change Policy Organization: Climate Change Department, Ministry of Environment and Tourism of Mongolia Email: narangaravuu@mne.gov.mn Address: Government Building Ⅱ, United Nations Street 5/2, Ulaanbaatar 15160

Summary of the CTCN technical assistance

This feasibility study aims to assess possibilities of green hydrogen production using electricity from renewable energy farms already in operation in Mongolia, to be transferred and used for hydrogen fueled gas turbine for cogeneration of heat and power supply, for which at present investigation is still needed. The following activities will be conducted, in cooperation with global companies that have experience introducing commercial-level products to the market. Additional study will be conducted to identify the necessary permits and funding possibilities.

1) Survey on green hydrogen production. Investigation of the amount of renewable energy that can be utilized, comparison of electrolyzers, and study on water resources and adaptation measures.
2) Survey on green hydrogen transportation. Investigation and selection of the optimal method of transportation and storage facilities.
3) Survey on green hydrogen utilization. Investigation of energy demand by the off-takers (hydrogen customers), study of heat and power supply system using green hydrogen.

National actors involved are the Ministry of Environment and Tourism, Ministry of Energy, Energy Regulatory Committee, and potential off taker. This study shall be completed by March 2023.

Technical Assistance Response Plan – Terms of Reference (DRAFT)

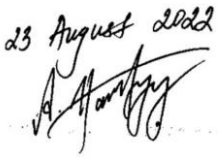
Agreement:

(If possible, please use electronic signatures in Microsoft Word file format)

Ministry of Environment and Tourism of Mongolia

Name: Narangaravuu A (Ms.)
Title: Office for Climate Change Policy

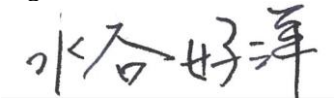
Date:
Signature:



Ministry of the Environment, Japan

Name: Yoshihiro MIZUTANI (Mr.)
Title: Director for International Cooperation for Transition to Decarbonization and Sustainable Infrastructure

Date:
Signature:



UNFCCC Climate Technology Centre and Network (CTCN)

Name: Rose Mwebaza
Title: CTCN Director
Date:
Signature:

Revised version cleared by:
Rajiv Garg, OIC CTCN
17/04/2023

Technical Assistance Response Plan – Terms of Reference (DRAFT)

1. Background and context

Mongolia is characterized by its abundant renewable energy resources, high solar power potential and optimal wind conditions identified throughout the country. Against this backdrop, Mongolia faces the challenge of developing low-carbon measures for carbon-intensive sectors such as heat supply, electricity, and transportation. Future decarbonizing efforts will depend on how broadly the country can integrate clean energy sources while reducing use of coal, and the adoption of innovative technologies.[1]

Hydrogen, with its high energy density under certain conditions, is an energy carrier that is suitable for storage applications such as batteries. Currently, green hydrogen is not explicitly integrated into Mongolia's domestic energy or climate policy framework, but if it is to be deployed more broadly to take advantage of the abundant renewable energy sources in Mongolia, several issues still need to be addressed, primarily production costs and infrastructure development. The cost depends primarily on 1) the cost of renewable energy generation, 2) facility utilization rate, 3) the cost of electrolysis equipment, and 4) transportation costs[2].

The type of electrolysis equipment affects overall equipment utilization rate. The most common types of electrolyzers in use today are alkaline electrolyzers and polymer electrolyte membrane (PEM) electrolyzers. Alkaline electrolyser technology is more mature and has lower production cost, but is difficult to adjust to peaks and drops in power supply; PEM technology is less mature, but can adjust to intermittent power supply more easily. For transportation, hydrogen can be liquefied (at temperatures below -253°C under atmospheric conditions) to reduce its storage volume, but due to the high level of cooling and compression conditions required, liquification costs are often higher than actual hydrogen production. In light of this situation, there are options such as converting hydrogen to more practical energy carriers, such as ammonia, or synthetic fuels.

Since water is an essential feedstock for hydrogen production and as coolant, an assessment of water availability and quality should be part of any green hydrogen project or strategy. On a stoichiometric basis, about 9 kg of water is required for 1 kg of hydrogen (IEA, 2019[3]). In water scarce regions, water requirements in green hydrogen technology can be a significant challenge as a limiting factor.

2. Problem statement

As a solution to integrate cleaner energy sources, Mongolia seeks for ways to establish green hydrogen production, transportation, and cogeneration of heat and power using green hydrogen. To deploy these technologies, there are some factors yet to be investigated to assess the feasibility of each process.

For production of green hydrogen, it is necessary to secure sufficient renewable energy for hydrogen production, and to select and install appropriate electrolyzers based on both the amount of hydrogen demand and the amount of electricity generated from renewable energy sources. The cost of electrolysis equipment to be installed is also a concern.

Regarding transportation of green hydrogen, if the hydrogen production and demand areas are far apart, it is necessary to consider whether to liquefy the hydrogen or to convert it into other carrier compound such as ammonia or MCH[4] for safe and economical storage and transportation.

[1] Government of Mongolia (2020) *Mongolia's Nationally Determined Contribution to the United Nations Framework Convention on Climate Change*. Available at: https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Mongolia First/First Submission of Mongolia%27s NDC.pdf.
[2] NewClimate Institute (2021), Green Hydrogen Applications in Mongolia, Technology potential and policy options
[3] IEA (2019), The Future of Hydrogen for G20. Seizing today's opportunities. About 8 kg of oxygen is produced as a byproduct.
[4] MCH: Methylcyclohexane. Hydrogen is added to toluene to produce MCH, a stable carrier compound.

For utilization of green hydrogen, it is necessary to consider the appropriate technical method to be adopted for cogeneration of heat and power by green hydrogen (or conversion to fuel cells, etc.), taking into account the off-taker demand and the above considerations for production and transportation.

3. Logical Framework for the CTCN Technical Assistance:

	Month											
	7	8	9	10	11	12	1	2	3	4	5	6
Objective: Feasibility assessment and understanding of technical requirements for realization of green hydrogen projects using renewable energy in Mongolia through production, storage, transportation of green hydrogen to be used for heat and power supply.												
Outcome: Promote the use of domestically produced energy that does not emit CO2 and air pollutants by introducing a system for the production, storage, transportation, heat and power supply of green hydrogen in Mongolia.												
Output 1: Development of implementation planning and communication documents												
Activity 1.1: i) A detailed work plan of all activities, deliveries, outputs, deadlines and responsible persons/organisations and detailed budget to implement the Response Plan. The detailed work plan and budget must be based directly on this Response Plan; ii) Based on the work plan, a monitoring and evaluation plan with specific, measurable, achievable, relevant, and time-bound indicators used to monitor and evaluate the timeliness and appropriateness of the implementation. The monitoring and evaluation plan should apply selected indicators from the Closure and Data Collection report template and enable the lead implementer to complete the CTCN Closure and Data collection report at the end of the assignment (please refer to item iv below and section 14 in the Response Plan); iii) A two-page CTCN Impact Description formulated in the beginning of the technical assistance and update/revised once the technical assistance is fully delivered (a template will be provided); iv) A Closure and Data Collection report completed at the end of the technical assistance (a template will be provided).												
Activity 1.2: Inclusion of gender perspective to above documents.												
Deliverable 1: i) Detailed work plan ii) Monitoring and evaluation plan iii) CTCN Impact Description		X										
iv) Closure and Data Collection report									X			

Output 2: Survey on Green Hydrogen Production												
Activity 2.1: Investigation of the amount of renewable energy that can be utilized Identify surplus power from operating plants and power supplied by new plants that can be utilized for green hydrogen production. Coordinate with the private sector. Wind conditions survey (approximately 6 months, including installation of wind towers).												
Activity 2.2: Investigation of electrolyzers Comparison of specifications and characteristics of electrolyzer manufacturers in Japan, UK, Norway, etc. Investigation of competitiveness. Selection of electrolyzers that are compatible with the amount of electricity actually available at the site and the hydrogen demand.												
Activity 2.3: Investigation of water resource and adaptation measures Investigation of water resource quantity and their suitability for use by the electrolyzer to be installed. Assessment of future water resource risks associated with hydrogen production and appropriate adaptation measures.												
Activity 2.4: Gender Assessment												
Deliverables 2: Results of renewable energy utilization study (including wind conditions study), electrolyzer comparison table and selection of the most suitable option, and water resource utilization adequacy/risk study.							X					
Output 3: Survey on Green Hydrogen Transportation												
Activity 3: Study of transportation methods from candidate sites. Technical investigation of transportation vehicles and liquid hydrogen storage facilities, etc., and selection of necessary infrastructure and requirements/costs for implementation.												
Deliverables 3: Results of hydrogen transportation technology survey							X					
Output 4: Survey on Green Hydrogen Utilization												
Activity 4.1: Investigation of Energy Demand Work with potential green hydrogen off-takers to investigate the details of their energy needs.												
Activity 4.2: Study of Heat and Power Supply System using Green Hydrogen Investigate the best possible and optimum combined heat and power system using green hydrogen that can be introduced based on demand, with cooperation from companies.												
Activity 4.3: Gender Assessment												

Deliverables 4: Results of demand investigation and study on cogeneration system using green hydrogen.							X					
Output 5: Coordination with related agencies to obtain permits and approvals												
Activity 5: Coordination with the Mongolian Ministry of Energy and Energy Regulatory Commission to obtain PPA and energy-related permits and licenses.												
Deliverables 5: Progress report on PPA and permits								X				
Output 6: Funding possibilities												
Activity 6.1: Possibilities on proposal to the Green Climate Fund Consider possibility of funding from the GCF as a cross-sectoral project of adaptation and mitigation, and make necessary arrangements.												
Activity 6.2: Arrangement for the actual project Study and make proposals on commercialization/operationalization of green hydrogen projects.												
Deliverables 6: Summary of realistic financing options with implementation structures proposed.									X			

4. Resources required and itemized budget:

Activities and Outputs	**Input: Human Resources** *(Title, role, estimated number of days)*	**Input: Travel** *(Purpose, national vs. international, number of days)*	**Inputs: Meetings/events** *(Meeting title, number of participants, number of days)*	**Input: Equipment/Material** *(Item, purpose, buy/rent, quantity)*	**Estimated cost** *Please accumulate the costing at Activity and Output level and provide an estimated costing range for each activity and the total Response Plan*	
					Minimum	**Maximum**
Output 1: Development of implementation planning and communication documents	***5,460-7,060***	***NA***	***NA***	***NA***	***5,460***	***7,060***
Activity 1.1: Formulation of i) Detailed work plan, ii) Monitoring and evaluation plan, iii) CTCN Impact Description, iv) Closure and Data Collection report.	*5,040-6,640* *12ManDay total* *PM, WCPM, PD PE, PDC, PC*	*NA*	*Web meetings for monitoring and evaluation planning, and data collection.*	*NA*	*5,040*	*6,640*
Activity 1.2: Inclusion of gender perspective to above documents.	*420* *GE*				*420*	*420*
Output 2: Survey on Green Hydrogen Production	***8,060-9,660***	***3400***	***1860***	***64850***	***78170***	***79,770***
Activity 2.1: Investigation of the amount of renewable energy that can be	*5960-7,560* *PM, WCPM, ETS, PDC, CS, PD, PE*	*3400* *Trip 1: Travel (Japan-Mongolia) and DSA for 2 experts for 4days.*	*430* *Translation service* *1430*	*64000* *Installation of wind power monitoring tower (One tower to be*	*76,070*	*77,670*

utilized			*Communication fee (SIM card, printing, etc)*	*Rented): Civil work, Transportation, installation, set up of monitoring sensors* *850* *Car rental for site visits*		
Activity 2.2: Investigation of electrolyzers	*840* *ETS, PE, WCPM, PD*	*NA*	*Web meetings with companies*		*840*	*840*
Activity 2.3: Investigation of water resource and adaptation measures	*840* *PM, WCPM, PD, WRA*	*Survey to be conducted in Trip 1.*			*840*	*840*
Activity 2.4: Gender Assessment	*420* *GE*				*420*	*420*
Output 3: Survey on Green Hydrogen Transportation	***4,030-5.630***	***NA***	***NA***	***NA***	***4,030***	***5,630***
Activity 3: Study of transportation methods from candidate sites, transportation vehicles and liquid hydrogen storage facilities.	*4,030-5,630* *PM, WCPM, PDC, CS, PD, ETS, PE, PC*	*If needed, survey to be conducted in Trip 1.*			*4,030*	*5,630*
Output 4: Survey on Green Hydrogen Consumption	***6,800-8,400***	***5,000***	***430***	***850***	***15,720***	***17,320***
Activity 4.1: Investigation of Energy Demand	*5,120-6,720* *PM, WCPM, PD, ETS, CS, PC*	*5,000* *Trip 2: Travel (Japan-Mongolia) and DSA for 3 experts for 4days.*	*430* *Translation service*	*850* *Car rental for site visits*	*14040*	*15,640*
Activity 4.2: Study	*1,260*				*1,260*	*1,260*

of Heat and Power Supply System using Green Hydrogen	*PM, WCPM, PD, ETS, PE*					
Activity 4.3: Gender Assessment	*420* *GE*				*420*	*420*
Output 5: Coordination with related agencies to obtain permits and approvals	***4,450-6,050***	***5,000***	***2,330***	***850***	***12,630***	***14,230***
Activity 5: Coordination to obtain PPA and energy-related permits and licenses.	*4,450-6,050* *PM, WCPM, PD, PDC, CS, ETS, PE, PC*	*5,000* *Trip 3: Travel (Japan-Mongolia) and DSA for 3 experts for 4days.*	*2,330* *Translation service (incl. documentation in Mongolian)*	*850* *Car rental for site visits*	*12,630*	*14,230*
Output 6: Funding Possibilities	***7,220-10,420***				***7,220***	***10,420***
Activity 6.1: Possibilities on proposal to the Green Climate Fund	*3,610-5,210* *PM, WCPM, PD, PDC, PE, PC*				*3,610*	*5,210*
Activity 6.2: Arrangement for the actual project	*3,610-5,210* *PM, WCPM, PDC, CS, PE*				*3,610*	*5,210*
Estimated range of costing for the entire Response Plan					***123,230***	***133,430***

5. Profile and experience of experts

Based on the required Human Resources identified in section 4 (Resources required and itemized budget) please provide a description of the required profile of all involved experts for the implementation of the CTCN Response Plan.

Experts required	Brief description of required profile
Please use the same titles for all experts as applied in section 4.	*Please provide a short description of expertise and experience needed (education, sectors of expertise, years of experience, country experience, language requirements, etc.).*
Project Manager (PM)	● Master's degree in climate science or equivalent field of specialization. ● A minimum 7 years of experience in leading, managing and delivering techno-commercial feasibility studies and socio-economic assessments for project development. ● Experience of designing and implementing the GCF concept notes and proposals. ● Demonstrated knowledge and understanding of climate modelling, mitigation and adaptation measures, and financing. ● Fluency in English.
WC Project Manager (WCPM)	● A minimum 7 years of experience in leading, managing and delivering techno-commercial socio-economic assessments for project development. ● Demonstrated knowledge and understanding of mitigation and adaptation measures, and financing. ● Fluency in English or Mongolian.
WC Project Developer (PD1)	● A minimum 3 years of experience in leading, managing and delivering techno-commercial socio-economic assessments for project development. ● Fluency in English or Mongolian.
WC Project Developer (PD2)	● A minimum 3 years of experience in leading, managing and delivering techno-commercial socio-economic assessments for project development. ● Fluency in English or Mongolian.
Energy Technology Specialist (ETS)	● PhD/Master's degree in the field of engineering, applied science or equivalent field of specialization. ● A minimum of 7 years of experience of conducting energy related technical assessments for communities and industries. ● Demonstrated experience of analyzing energy related data, and conducting feasibility studies in the related field. ● Demonstrated experience of working in Mongolia. ● Fluency in English.
Water Resources Analyst	● Master's degree in water resource management field.

(WRA)	● A minimum of 5 years of experience working on water resource management including socio-economic analysis and modelling.
Process Engineer (PE)	● Master's degree in the field of engineering, applied science or equivalent field of specialization. ● A minimum of 5 years of experience in working on environmental issues. ● Demonstrated knowledge and understanding of industrial processes and environmental impact assessments. ● Fluency in English.
Project Development Coordinator (PDC)	● Bachelor's degree in humanity field. ● Demonstrated experience in managing and delivering stakeholder meetings. ● Experience of designing and implementing the GCF concept notes and proposals. ● Fluency in English.
Communications Specialist (CS)	● Bachelor's degree in humanity field. ● A minimum of 5 years of experience working in environmental issues in Mongolia. ● Demonstrated experience of working with communities in Mongolia ● Fluency in English or Mongolian.
Project Coordinator (PC)	● Bachelor's degree in humanity field. ● Fluency in English or Mongolian.
Gender Expert (GE)	● Understanding and demonstrated ability of gender considerations. ● Fluency in English.

6. Intended contribution to impact over time

If Mongolia's high renewable energy potential can be utilized to produce green hydrogen, GHG and air pollutant emissions from coal combustion can be completely eliminated within the target area. Currently in Mongolia, more than 90% of the energy required for heating comes from coal combustion, resulting in per capita GHG emission of 6.67t-CO2/yr, higher than the global average of 4.42t-CO2/yr (IEA[5]). Pollution from coal combustion for heating and from car exhaust has marked annual average value of fine particulate matter in the Ulaanbaatar city center 7.5 times the WHO standard (25 mg/m3N) in 2016. In December, the Ger district records a value about 80 times (1,985 mg/m3N) the standard.

Production of green hydrogen using excess renewable energy will function as a storage battery, contributing to resolve the instability in the power system in Mongolia caused by the massive introduction of renewable energies since 2013, possibly with cost advantage. Enhancing energy storage capacity will also increase the amount of renewable energy that can be connected to the Mongolian power grid. If combined heat and power generation technology using green hydrogen can be deployed in Ulaanbaatar, the beneficiary population will be 1.64 million.

[5] IEA Key World Energy Statistics "CO2 emission by region" (2020), the data is for 2018

7. Relevance to NDCs and other national priorities

Mongolia's NDC targets a GHG reduction of 22.7% by 2030, compared to 2010 levels. It calls for increasing domestic solar power generation to 145 MW by 2030, wind power to 354 MW, and the share of renewable energy to 30%. Meanwhile, in order to stabilize the power grid, the Ministry of Energy has mandated installing storage batteries equivalent to 20% of rated capacity for 4 hours (solar power) and 40% of rated capacity for 4 hours (wind power) when introducing renewable energies in new projects. However, due to the high cost of storage batteries, the introduction of renewable energies is currently not progressing. As mentioned in the previous section, enhancing storage capacity through green hydrogen production will lead to an increase in the amount of renewable energy that can be connected to the Mongolian power grid, and thus will contribute to achieving the NDC targets for GHG reduction and renewable energy introduction.

In relevance to national priorities on adaptation, since water is an essential raw material for hydrogen production, it is important to assess water availability and quality, especially in areas such as South Gobi, for which future projections from climate models by ECHAM indicate the risk of increased drought frequency and intensity between 2020 and 2050. Water is also typically used as a coolant in the electrolysis process, which further increases the overall water requirement. The Government of Mongolia updated its NDC in 2020, which now aims to strengthen sectoral coordination to enhance the resilience of the water sector utilizing appropriate technologies for sustainable use of water resources, as well as the enhancement of disaster management systems against drought hazard. Water resource management is also one of the priority areas in the NAP process which the government has launched in 2019. In this study, the future drought risks for the area near the candidate site in South Gobi will be estimated using projection results from the climate models[6] underlying the IPCC assessment report. Standard rainfall index and a drought index will be referred as output[7]. Experts will be interviewed to determine whether refinement of the impact assessment of climate change on water resources is possible. Based on these results, installation of water storage tanks and deep wells will be considered as measures to adapt to any climate conditions.

[6] CMIP6-Coupled Model Intercomparison Project Phase 6, data will be downscaled assuming linear interpolation
[7] Carrão et al. (2018) 'Global projections of drought hazard in a warming climate: a prime for disaster risk management'

8. Linkages to relevant parallel on-going activities:

No linkages

9. Anticipated follow up activities after this technical assistance is completed:

The investigation on the requirements for actual business implementation will be conducted by partnering with companies that already have commercial-level products in the market. This study will create a stepping stone to the next stage, which is a trial demonstration at the Off taker site. Initially, this project will be promoted as a JCM[8] project, and the possibility of financing will be investigated referring to the outcome from this study, including equity participation from companies, loans and grants from the GCF, and loans from other international development banks.

In parallel, the possibility of applying to the GCF Readiness Programme in cooperation with CTCN and the Mongolian GCF NDA will be pursued. Application to the Readiness Programme has been agreed with the Mongolian GCF NDA and has already been mentioned in the Request Submission Form submitted to the CTCN. The outputs and deliveries will be used for project formation and gap and cost analysis for GCF application as a cross-cutting project.

10. Gender and co-benefits:

Imbedded in design of the activities:	The feasibility study will consider ways in which all, men and women as well as children and the disadvantaged, can contribute to and benefit from the project in order to achieve society for "Leaving no one behind" through gender analysis. This will be conducted at each stage of the study to ensure that gender perspective is included in project design and appropriately documented, and that women, as well as their male counterparts, will be benefiting from this project in terms of food/beverage security, employment/income and health. This study aims to assess feasibility for combined heat and power supply using green hydrogen, and so by design, stabilizing the power systems and mitigating air pollution is part of the main outcome of the project. Impact on water resource will also be assessed. These anticipated results and co-benefits will help reduce air pollution, improve power system stability and increase people's resilience against water insecurity.
Gender and co-benefits intended as result of the activities:	• Strengthen safeguards of a gender inclusive project-related employment • Capacity building activities including local industries on the technologies for green hydrogen production, transportation, and cogeneration to supply heat and electricity, including water resource management • Building mechanism for project decision making, which includes women and targeted communities • Introduction of gender strategy to improve gender awareness throughout the whole project chain

11. Main in-country stakeholders in implementation of the technical assistance activities:

Using the table below, please list and describe the role of in-country stakeholders, participants and beneficiaries who will be involved in or directly consulted during implementation of the assistance.

In country stakeholder	Role in implementation of the technical assistance
National Designated Entity (Ministry of	Overall oversight of the TA, day to day management

[8] Joint Crediting Mechanism

Environment and Tourism, Mongolia)	and coordination of the TA, Facilitate communities and landowners' consultations Lead in coordination and conduct of national/online consultations and workshops.
Ministry of Energy, Mongolia	Energy business jurisdiction organization, which provide technical advice and support to the NDE and Request Applicant.
Energy Regulatory Committee	Provide advice for license management for renewable energy and energy supply as appropriate.
Other line ministries	Participate in national/online consultations as appropriate
TBC	Supply of existing data and review of analysis as appropriate
Coal-fired power plants (CHP2)	Supply of existing data and review of analysis as appropriate

12. SDG Contributions:

*Instructions: Please complete the grey section below for **a maximum of three SDGs** that will be advanced through this TA. A complete list of SDGs and their targets is available here: https://sustainabledevelopment.un.org/partnership/register/.*

Goal	Sustainable Development Goal	Direct contribution from CTCN TA (1 sentence for top 1-3 SDGs)
1	End poverty in all its forms everywhere	
2	End hunger, achieve food security and improved nutrition, and promote sustainable agriculture	
3	Ensure healthy lives and promote well-being for all at all ages	
4	Ensure inclusive and equitable quality education and promote life-long learning opportunities for all	
5	Achieve gender equality and empower all women and girls	
6	Ensure availability and sustainable management of water and sanitation for all	
7	Ensure access to affordable, reliable, sustainable, and modern energy for all (consider adding targets for 7)	
	7.1 - By 2030, ensure universal access to affordable, reliable and modern energy services	
	7.2 - By 2030, increase substantially the share of renewable energy in the global energy mix	
	7.3 - By 2030, double the global rate of improvement in energy efficiency	
	7.a - By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology	By assessing the feasibility of green hydrogen production, transportation and utilization, the TA will support in enhancing the use of renewable energy and promote investment in energy infrastructure and clean energy technology.
	7.b - By 2030, expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries, small island developing States, and land-locked developing countries, in accordance with their respective programmes of support	
8	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all	
9	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	
10	Reduce inequality within and among countries	
11	Make cities and human settlements inclusive, safe, resilient and sustainable	
12	Ensure sustainable consumption and production patterns	
13	Take urgent action to combat climate change and its impacts	*All TAs should indicate relevance to Goal 13 and at least one target below (13.1 to 13.b).* By reducing the reliance on coal fuel for energy generation, the TA will support in reducing the GHG emission.
	13.1 - Strengthen resilience and adaptive capacity to climate-	Reservoirs and deep wells as adaptation measures

	related hazards and natural disasters in all countries	will potentially ensure adaptability toward drought frequency and intensity.
	13.2 - Integrate climate change measures into national policies, strategies and planning	
	13.3 - Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning	
	13.a - Implement the commitment undertaken by developed-country parties to the United Nations Framework Convention on Climate Change to a goal of mobilizing jointly $100 billion annually by 2020 from all sources to address the needs of developing countries in the context of meaningful mitigation actions and transparency on implementation and fully operationalize the Green Climate Fund through its capitalization as soon as possible	
	13.b - Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities	
14	Conserve and sustainably use the oceans, seas and marine resources for sustainable development	
15	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	
16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels	
17	Strengthen the means of implementation and revitalize the global partnership for sustainable development	

13. Classification of technical assistance:

Please indicate primary type of technical assistance. Optional: If desired, indicate secondary type of technical assistance.

Please tick off the relevant boxes below	*Primary*	*Secondary*
☐ 1. Decision-making tools and/or information provision	☐	☐
☐ 2. Sectoral roadmaps and strategies	☐	☐
☐ 3. Recommendations for law, policy and regulations	☐	☐
☐ 4. Financing facilitation	☒	☐
☐ 5. Private sector engagement and market creation	☐	☒
☐ 6. Research and development of technologies	☐	☒
☐ 7. Feasibility of technology options	☒	☐
☐ 8. Piloting and deployment of technologies in local conditions	☐	☐
☐ 9. Technology identification and prioritisation	☒	☐

Please note that all CTCN technical assistance contributes to strengthening the capacity of in country actors.

14. Monitoring and Evaluation process

Upon contracting of the implementing partners to implement this Response Plan, the lead implementer will produce a monitoring and evaluation plan for the technical assistance. The monitoring and evaluation plan must include specific, measurable, achievable, relevant, and time-bound indicators that will be used to monitor and evaluate the timeliness and appropriateness of the implementation. The CTCN Technology Manager responsible for the technical assistance will monitor the timeliness and appropriateness of the Response Plan implementation. Upon completion of all activities and outputs, evaluation forms will be completed by the (i) NDE about overall satisfaction level with the technical assistance service provided; (ii) the Lead Implementer about the knowledge and learning gained through delivery of technical assistance; and (iii) the CTCN Director about timeliness and appropriateness of the delivery of the activities and outputs.

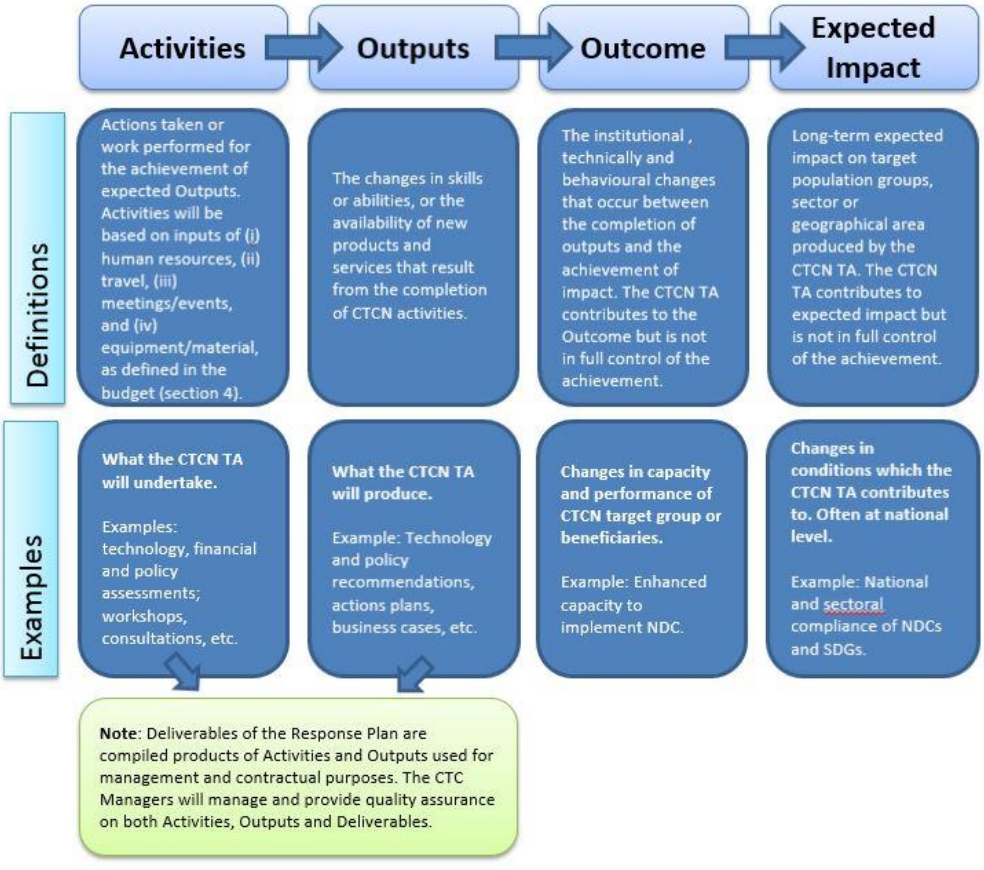
Annex 1: Guidance note for designing a Response Plan (to be deleted when submitting the Response Plan)

1. Objective of the Response Plan

The Response Plan is developed by CTCN specialists in response to a country request for technical assistance. It constitutes the Terms of Reference of the CTCN technical assistance that will be provided to the country and it provides the formulation of and subsequent basis for the monitoring and evaluation of the Response Plan implementation, as well as its expected outcomes and anticipated impacts.

2. Results chain and Logical Framework Approach to be defined in the CTCN Response Plan

The result chain is the causal sequence that stipulates the necessary flow of actions and processes to achieve desired objectives and results – beginning with inputs, moving through activities and outputs, and culminating in individual outcomes. The outcome will contribute to the desired impact in the society. The Logical Framework Approach is an analytical process used to support objectives-oriented project planning and management. It provides a set of pre-defined concepts which are used as part of an iterative process to aid structured and systematic analysis and management of the CTCN technical assistance.



3. Role of the Response Planning Design Team

The Response Planning Design Team is selected by the Climate Technology Centre (CTC). The composition of the team depends on each particular request but may include the National Designated Entity (NDE), the request Proponent, Climate Technology Manager of the CTCN, experts from the CTCN Consortium, UNIDO and UNEP experts from regional offices and other experts as needed.

The role of CTCN Consortium experts is to lead the design of the Response Plan. The NDE will provide overall guidance on national context and priorities whereas the request Proponent will provide more detailed information on the sector, barriers and requested assistance. The Climate Technology Manager of the CTCN will provide quality assurance of timeliness and appropriateness of the Response Plan.

The Response Planning Design Team will draft all sections of the Response Plan template building on the information contained in the CTCN Request, based on expertise on the given topic and potentially further data collection, as required. This will be done by the CTCN Consortium Experts in consultation with the NDE, request Proponent and relevant stakeholders. The Response Plan has to be agreed to and approved by the NDE and the CTCN Director. This Response Plan will serve as the basis to identify, select and engage an expert institution from the Climate Technology Network or Consortium to lead the implementation of the CTCN Response Plan in the requesting country.

To the extent possible, staff from UNEP and UNIDO Regional, Sub-Regional and/or National Offices should be involve in all stages of formulation of the Response Plan to maximize synergies and avoid overlap with ongoing initiatives, as well as ensure relevance to regional and national context.

4. Process for designing the Response Plan

The Response Planning process should be completed over a period of up to 60 working days (12 weeks). Indicative steps and related timelines are laid out below:

5. Design Considerations

In order to maximize the impact of the technical assistance provided by the CTCN and provide an effective M&E process, the Response Plan should integrate as much as possible the considerations below:

Climate Technology focus: The Response Plan should have a clear focus on climate technologies, and identify activities that enable the identification, development, deployment or diffusion of one or several specific technologies (including equipment, techniques, knowledge and skills).

Barrier removal / Problem solving: The activities should contribute to address the specific problem statement identified in the Request. The barriers identified should be those hampering the identification, development, deployment or diffusion of one or several climate technologies or climate actions. Therefore, it may be necessary to limit the CTCN Response Plan to a set of activities for technical assistance commonly agreed with the NDE (and Proponent when needed) compared to the original request submitted. The CTCN will liaise with NDEs and Proponent in case the scope of the technical assistance deviates from the original request.

Use of the CTCN assistance by stakeholders: The Response Plan should identify clearly how the products of the CTCN assistance will be used in the short term once support is delivered, by who and when, to ensure it will lead to specific impacts in the country. The activities should engage the stakeholders that will use the concrete results of the assistance to deploy the technologies, including from the private sector, the public sector, research institutions, etc.

Within the scope of CTCN resources: The cost of the technical assistance provided by the CTCN cannot exceed USD 250,000 per Response Plan. Therefore, it may be necessary to prioritize activities and limit the CTCN Response Plan to a set of priority activities commonly agreed with the Proponent and the NDE to remain under this value. Under section 4 of the Response Plan template, an indicative activity based budget should be presented. The proposed budget is indicative and should present an estimated costing range per activity, output as well as a total costing range for the delivery of the Response Plan. Once the Response Plan is finalised and published for tendering, interested parties will provide competitive offer against the indicative budget.

CTCN activities and outputs should be linkable to monitoring and evaluation indicators: All proposed activities and outputs must be linkable to monitoring and evaluation indicators that are specific, measurable, achievable, relevant, and time-bound. The monitoring and evaluation process and corresponding indicators will be developed by the Lead Implementer as part of the work plan and will allow the CTCN technology Manager to monitor the timeliness and appropriateness of the implementation.

Synergies with existing efforts: The Response Plan should focus on activities that are not already being fully supported or that are in the process of being fully supported by another national, regional or international organization. Synergies and complementarity also require that the CTCN assistance is not duplicating past activities. It is possible in the Response Plan to indicate co-financing from the government, the Proponent or another stakeholder, that will maximize the effectiveness of the CTCN assistance.

Gender mainstreaming: The CTCN mission is to build or strengthen developing countries' capacities to identify technology needs, to facilitate the preparation and implementation of technology projects and strategies taking into account gender considerations. The Response Plan must therefore describe how gender considerations will be included and monitored within the proposed activities, and any gender co-benefits that will be gained as a result of implementing the CTCN technical assistance.