CTCN
CLIMATE TECHNOLOGY CENTRE & NETWORK

Technical Assistance
Response Plan – Terms of Reference

Country	**Benin**
Request ID#	**2015000071**
Title	Feasibility study and development of an action plan for the promotion of manufacturing of components of small power wind turbines
NDE	Raphiou Adissa Aminou, Director of Mitigation Climate Change and Promotion of Green Energy. CTCN Focal Point Direction General of the Climatic changes 06 BP 2570 Cotonou, Benin (+229) 90 04 59 19/97748748 / 95 22 30 89 aminou_raphiou@yahoo.fr,
Proponent	Juste Christel Tankpinou Damada, Public Works Technical Services Engineer at the Department of New and Renewable Energy Directorate General for Energy 01 BP : 2171 Cotonou, Benin (+229) 97 76 17 73 nonojust2@yahoo.fr,

Summary of the CTCN Technical Assistance

This technical assistance responds to Benin's request to receive support with testing feasibility of, and thereby laying the fundament for, the establishment of locally manufactured small wind technology and in the country. Benin, with low electricity access rates particularly in rural regions is striving to increase access through renewable energy, but wind energy has so far not been exploited in spite of good potentials.

In view of limited support for and experience with small wind energy the CTCN was asked to analyze whether small wind component manufacturing is feasible taking into account local conditions and advise planning of a pilot production facility. The response by the CTCN outlined in this document will address the inquiry by carrying out a feasibility study of local component manufacturing involving the local experts into the study to ensure applicability. In case of a study outcome in favor of local manufacturing of the small wind components a second phase of the intervention would develop an action plan outlining the necessary steps to establish a manufacturing facility to trigger a local market. In case of a negative outcome the CTCN will explore opportunities to improve access to renewable energy based electricity in rural areas vie. e.g. different technologies and give recommendations.

After successful completion of the intervention stakeholders in Benin will be informed of the potentials of a small wind component manufacturing market in the country and given the knowledge on how to grow an industry and market.

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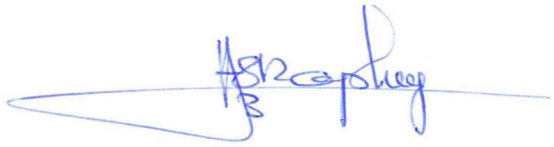
Agreement:

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

National Designated Entity to the UNFCCC Technology Mechanism for which the Climate Technology Centre and Network is the operative arm

Name: Raphiou Adissa Aminou
Title: Director of Mitigation Climate Change and Promotion of Green Energy.
Date: 01/03/2017
Signature:



UNFCCC Climate Technology Centre and Network (CTCN)

Name: Jukka Uosukainen
Title: CTCN Director
Date: 3 March 2017
Signature:

1. Background and context

Like most sub-Saharan African countries, Benin has low electricity access rates among households with 31.03 % at national level, 58.02 % in urban areas and 6.8 % in rural areas (2014 data).The Government of Benin began a rural electrification program in 1993 with the goal of increasing access to electricity for rural populations. This program consisted of installing solar photovoltaic systems in small isolated communities as an alternative to extending the national electric grid. Building on these initial efforts, The Benin Agency for Rural Electrification and Energy Management (ABERME) was created in 2004 to implement a coordinated national rural electrification policy, which has so far supported the development of several rural electrification projects. In June 2013, the National Development Agency of Renewable Energies was established to implement renewable energy and energy efficiency policies, including a 25% renewable energy goal.

For Benin to achieve its sustainable development, environmental preservation, greenhouse gas emission reduction, and energy independence goals, the government and other energy institutions must support increased deployment of renewable energy. In addition to solar and hydro resources, studies have shown that Benin also has good small wind resources in its coastal areas that could be a source of power to rural populations in those areas. However, thus far, wind resources remain underutilized in Benin with only a few existing facilities.

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1. Problem statement

In order to accelerate and expand renewable energy based electrification Benin aims to also utilize its wind resources to complement solar, hydro and biomass energy. In spite of the carried out studies that concluded sound potential for small scale wind in coastal areas deployment of the technology has not taken off. Stated as reasons for this were a lack of commitment to plans and strategies, a general lack of interest in wind energy, as well as very limited capacity both within the public and private sector to identify and address current barriers. One known barrier is the cost of small wind technology, which is why investment activities have been limited. To respond to this the request aims at creating a local industry using materials and components that can be sourced locally and therefore easily and cheaply, as well as easy to maintain.

This assistance seeks to advise Benin on the question whether or not kick-starting a local wind manufacturing and deployment market by first analyzing feasibility of local manufacturing of equipment. Then, if the results of the feasibility study are positive, a second phase of the intervention will produce recommendations to Benin as to how to create a manufacturing market as well as how to spur the installation of small wind turbines through capacity building, policies, regulations, programs, and other measures.

2. Logical Framework for the CTCN Technical Assistance:

	Month					
	1	2	3	4	5	6
Objective: To identify key barriers to and opportunities for a local manufacturing industry of small wind turbines and the creation of a market with potential for growth.						
Outcome: Benin stakeholders will be informed about the potentials of local small wind component manufacturing and a market to sell the produced technology to generate renewable energy in rural areas that were previously lacking reliable energy access. Should the technology be deemed feasible stakeholders will furthermore be advised on how to plan a pilot manufacturing plant. In case feasibility cannot be concluded stakeholders will be advised about alternative opportunities to improve access to renewable energy based electricity in rural areas.						
Output 1: A report of the feasibility study on local manufacturing of small wind technology in Benin. The study will take into account the current state-of-play for a small wind market in Benin including barriers to growth, current and planned regulatory actions and information on human capacity needs, based on an in-country assessment in collaboration with local experts including government, private sector, and other stakeholders; additional online research; and conversations with development partners.						
Activity 1.1: Prepare an outline for the feasibility study and identify key stakeholders in collaboration with NDE and proponent	■					
Deliverable 1.1: Study outline and list of key stakeholders	■					
Activity 1.2: Organize and set up conference call to discuss and confirm the outline and scope of the study and identify local experts for subcontracting.	■					
Deliverable 1.2: Conference call minutes with conclusions; list of local experts	■					
Activity 1.3: Contract local experts and conduct preparatory research online and through phone calls with development partners and others; make arrangements for in-country meetings		■				
Deliverable 1.3: Expert contracts and work plan		■				
Activity 1.4: Conduct in-country data collection and stakeholder consultations.		■	■			
Activity 1.5 Evaluate results from the data collection and consultations and write report			■	■		
Deliverable 1.5: Draft summary report for review by the proponent and NDE				■		
Activity 1.6: In-country meeting to present and discuss study results; start discussion on next steps and the action plan (see Activity 2.1)				■		
Deliverable 1.6: Final study report; Draft outline and scope for action plan				■		

Output 2: If the results of Output 1 are positive and a small wind manufacturing and deployment market is considered feasible: An Action Plan will be developed that will consist of details of small wind industry goals for the 2020 and 2030 timelines, a summary of small wind industry opportunities and pathways to fulfill these opportunities, and a high-level plan for implementation of a pilot manufacturing project. (If the results of Output 2 are negative and a small wind manufacturing and deployment market is considered not feasible: A set of recommendations about alternative opportunities to generate access to and/or produce renewable energy technology locally.)						
Activity 2.1: Identify and invite additional key stakeholders (if necessary), and host an initial stakeholder meeting to determine aim and scope of next steps (in coordination with Activity 1.6)						
Deliverable 2.1: Action Plan outline and initial recommendations, and stakeholder input on plan requirements.						
Activity 2.2: Develop draft action plan						
Deliverable 2.2: Advanced draft action plan to be shared with stakeholders for their review.						
Activity 2.3: Incorporate feedback to develop final draft action plan and prepare final meeting to present plan to stakeholders.						
Deliverable 2.3: Meeting report and final action plan.						
Monitoring and Evaluation						

3. 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 the total Response Plan*	
					Minimum	**Maximum**
Output 1: Feasibility Study on Small Wind Market in Benin	*Small Wind Energy Economics Specialist, Determine design and components for production, 24 days*	*Flight tickets to Benin for two experts to present and discuss outcome of feasibility*	*Stakeholder meeting, 20 participants, 2 days*	*Room rental and catering for 20 participants, 2 days*	*32,000*	*48,000*

	Senior Small Wind Manufacturing process specialist, Take project lead and determine equipment and processes needed (incl. costs), 22 days *Local manufacturing and supply chain specialist, gather information, 18 days*	*study and next steps 7 days*				
Output 2: Action Plan	*Small Wind Energy Economics Specialist, Determine design and components for production, 13 days* *Senior Small Wind Manufacturing process specialist, Take project lead and determine equipment and processes needed (incl. costs), 13 days* *Local manufacturing and supply chain*	*Flight tickets to Benin for two experts to present and discuss action plan, 2 days*	*Stakeholder meeting, 20 participants, 2 days*	*Room rental and catering for 20 participants, 2 days*	*16,000*	*25,000*

	specialist, gather information, 4 days					
Monitoring and evaluation	*Project leader, 5 days*	*NA*	*NA*	*NA*	*2,500*	*4000*
Estimated range of costing for the entire Response Plan					*50,500*	*77,000*

4. Profile and experience of experts

Experts required	Brief description of required profile
Small Wind Energy Economics Specialist	This expert has experience with and understands the technical components of wind systems, installation and operations requirements, wind resource assessments and key market drivers. French language skills are required.
Senior Small Wind Manufacturing process specialist	This expert has substantial experience with manufacturing process design, especially in the small wind technology sector. The expert has sound understanding and experience with the needs and limitations developing countries are facing in this regard. The expert furthermore has experience with leading technical assistance projects in developing countries, including M&E reporting and budget supervision. French language skills are required.
Local manufacturing and supply chain specialist	This local expert has experience with industrial economics and supply chains and sound understanding of local markets and socio-economic circumstances. The expert is a strong communicator and organizer. French and English language skills are required.

5. Intended contribution to impact over time

The following are intended impacts if the small wind manufacturing and deployment action plan were to be implemented by the Benin government:

Short term:

1. Expand access to reliable electricity supply for rural populations to specifically support income-generating activities and provide improved educational and health services, as well as gender benefits
2. Generate green jobs at the local level

Medium term:

3. Promote and generate green jobs at the regional/national level.
4. Give impetus to wind energy which is struggling to take off in this country.
5. Ensure that there are attainable benefits for players involved in the sector of technology transfer.
6. Create a passion for renewable energy, and wind energy in particular.

Long-term:

7. 8. Contribute to reducing greenhouse gas emissions.

6. Relevance to NDCs and other national priorities

In 2015 the Ministry of the Environment, the entity responsible for managing climate change, reforestation, and the protection of natural resources and forestry, published the *Contributions planned determined to national level*. This report identified targets for various sectors (energy, forestry, waste and sanitation, agriculture, framework institutional and regulatory) to be reached by 2030. One energy sector target was for increased production of electricity from renewable sources.

The Strategic plan for development of the energy sector in Benin published in 2009 by the Directorate General for Energy also aligned with the goals of the 2008 Policy. This 2009 strategic plan called for the installation of wind power units to begin with 10 MW in 2011 and a plan to reach 20MW in 2015. Only a small share of this plan was carried out.

The *Benin rural electrification policy* planned to electrify 150 locations per year to reach a rural electrification share of 40% by 2015. This electrification target has not been reached, however the assistance, currently being requested, could support Benin in reaching this target if it is conducted together with measurement and evaluation activities.

7. Linkages to relevant parallel on-going activities:

The *Second national communication of the republic of Benin* on climate change published by the Ministry of Environment, Housing, and Urban Development indicated that the energy sector contributed 30% to the total emission of greenhouse gases Greenhouse (based on 2000 data).

The report, *Establishment of a regulatory legal framework for investment incentives in the sub-electricity sector* depicted the energy situation of Benin in 2010, and the potential outlook. This

reported identified the possibility of exploitation of wind energy as the average wind speeds are greater than 5m / s in specific regions of the country.

A Benin power sector policy document published in 2008 set four goals. One of these goals was "To promote rural electrification, the energy balance, and bioenergy sectors." A 2009 study of wind energy potential called for the installation of five pilot sites of 2MW each, and a scale up to reach 30MW in 2025. This has not yet been implemented.

The *Development in low carbon intensity changes strategy and resilient climate* from the Regional Capacity Building Program (ADETEF/AFD-UNDP) presented a strategic development plan for Benin which emphasized the role of renewables in the energy sector.

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

After the CTCN intervention has been completed a number of activities are anticipated to be carried out by the beneficiaries to utilize the outcomes:

Short term:

- Capacity building of staff to operate a small wind manufacturing plant (if necessary)
- Development of a pilot manufacturing plant
- Removal of potential barriers to small wind market development (if necessary)

Long term:

- Expansion of small wind manufacturing to the national scale
- Development of a project to establish a professional wind energy training centre
- Introduction of incentives to establish a wind turbines production sector

9. Gender considerations:

Imbedded in design of the activities:	Output 1 will include a high-level assessment of the degree to which all genders have currently participated in the wind energy sector in Benin and Output 2 will include specific recommendations for ensuring engagement of women and men in the wind energy market, both on the side of energy providers as well as energy consumers. During Monitoring and Evaluation engagement of all genders will be ensured.
Co-benefits intended as result of the activities:	Implementation of the action plan would be carried out in such a way as to consider creation of opportunities for both women and men to engage in the wind energy market. This applies equally to private and public sector participants, producers and consumers.

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

In country stakeholder	Role in implementation of the technical assistance
Director of Mitigation Climate Change and Promotion of Green Energy. CTCN Focal Point	Ensures that the CTCN is meeting Benin's needs regarding this request; Optional: participates in meetings and discussions.
Public Works Technical Services Engineer at the Department of New and Renewable Energy	Provides quality assurance on the technical assistance response, reviewing outlines and drafts and providing timely feedback; Participates (or delegates) in all

Directorate General for Energy	discussions and meetings with the CTCN; Provides in-country stakeholders contacts and supports coordination and travel visits by the CTCN response expert team.
Beninese Agency for Rural Electrification and Energy Management (ABERME)	Provides data on current projects, funds, and private sector participation in the Benin renewable energy market. Reviews the outputs.
Ministry of the Environment	Provides data that can help inform the outputs, given their understanding of the local market and current programs and policies for renewable energy. The Ministry of the Environment could also be a reviewer of the feasibility study and the action plan.
Regional Capacity Building Program (ADETEF/AFD-UNDP)	Provides data that can help inform the outputs, given their experience working in Benin.
The Benin Centre for Scientific and Technical Research (CBRST) and the Polytechnic School of Abomey	Provides data that can help inform the outputs and reviews and provides inputs on training components in the action plan, if any.
National Agency for the Development of Renewable Energies and Energy Efficiency (ANADER)	Provides data that can help inform the outputs.

11. SDG Contributions:

Goal	**Sustainable Development Goal**	**Direct contribution from CTCN TA** (1 sentence for top 1-4 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)	Implementation of this action plan can support deployment of small wind energy.
	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	Implementation of the action plan provided through this response would contribute to the increase of renewable energy deployed.
	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	
	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	Implementation of the action plan provided through this response would provide for new and decent employment opportunities
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	
	13.1 - Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries	
	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	The action plan provided under this response will enhance Benin's capacity to mitigate climate change through the deployment of clean, wind energy systems, while taking into account the opportunities of marginalized communities to participate in the wind market.
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	

12. Classification of technical assistance:

Please tick off the relevant boxes below	*Primary*	*Secondary*
☐ 1. Technology identification and prioritisation	☐	☐
☐ 2. Research and development of new climate technologies	☐	☐
☐ 3A. Feasibility studies for specific known climate technology options	☒	☐
☐ 3B. Piloting of known technologies in local conditions	☐	☒
☐ 4A. Law, policy and regulatory reform recommendations	☐	☒
☐ 4B. Sector specific roadmap or strategy design	☒	☐
☐ 5. Finance facilitation and market creation	☐	☐

1. 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.