



United Nations Industrial Development Organization

TERMS OF REFERENCE (TOR)

Title: Accelerating the transition to sustainable mobility and low carbon emissions in Panama City

CTCN request reference number: 2017000033

Country: Panama

1 BACKGROUND INFORMATION

The Climate Technology Centre and Network (CTCN) is the operational arm of the United Nations Framework Convention on Climate Change (UNFCCC) Technology Mechanism and co-hosted by the United Nations Environmental Programme (UN Environment) in collaboration with the United Nations Industrial Development Organization (UNIDO) and supported by 11 partner institutions with expertise in climate technologies. The mission of the CTCN is to promote accelerated development and transfer of climate technologies at the request of developing countries for energy-efficient, low-carbon and climate-resilient development.

These requests for Technical Assistance (TA) are being submitted to the CTCN by the National Designated Entity (NDE) of the respective country. The scope of services under these Terms of Reference shall be executed based on a restricted solicitation process. By mandate, only accepted Members of the CTC Network are eligible to submit proposals and execute the required services to implement the response. Should the bidder partner with another institution to deliver a minor part of the services described in these Terms of Reference, it is expected that the partner institution also joins the CTC Network.

In case you are not a CTCN network member yet, you may bid for implementation of the technical assistance, subject to the condition that you submit your completed application for CTCN Network membership before the last date of the bid closure and the same is acknowledged by the CTCN. Furthermore, the contract award – should your bid be selected – is conditional to your network membership application having been successfully approved by the Director of CTCN.

The maximum budget for this contract is USD\$ 100,000.

Important note: The bidders must quote for Output 1 and for rest of the outputs separately (split budget). This is to ensure that we can close the intervention after Output 1, in case the proposed Response plan is not amenable to be implemented, due to force majeure or any other political issues. However, the total value of the bid would be considered while awarding the contract.



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2 CONTEXT OF THE ASSIGNMENT

Panama is working on the transformation of the traditional scheme of public transportation by a regulated and integrated system, which will offer the citizens the possibility of having a quality and accessible service. This technical assistance will analyse the introduction of low or zero emission buses in the city. It will execute a comparative analysis of two alternatives that the city is considering: electrical buses and natural gas buses. Besides these two, it will also indicate other transport alternatives that can be helpful to strengthen the public transport system.

The recent arrival of natural gas in Panama brings the opportunity to use this fuel in transportation, whilst the advances within the electric mobility field offer a very attractive and more environmentally friendly alternative. In this context, TMP (Transporte Masivo de Panamá) will have to renew its fleet of buses for the metropolitan area and it is necessary to make a decision on what type of buses will have to integrate this new fleet. This decision will involve investments in both equipment (buses) and infrastructure (natural gas or electrical charging stations), as well as regulations. The technological options to be chosen will need to be integrated into the country energy system planning, with emphasis on the overall energy sources mix scenario. This approach will support the National Energy Secretariat, which considers it essential to have an evaluation that can lead to a strategic decision, in line with the objectives of the country.

For the analysis, feasibility studies (technical, financial, environmental, social) will be carried out to determine which alternative to prioritize. The objective will be to facilitate strategic decision making for the transportation sector in Panama City.

The full text of the request submitted to the CTCN can be found here: <https://www.ctc-n.org/technical-assistance/requests/accelerating-transition-sustainable-mobility-and-low-carbon-emissions>

3 OBJECTIVE OF THE CONTRACT

Scope and activities of the proposed contracted services

In order to get a better understanding of the context of the request for technical assistance, it is recommended that the Contractor refer to the complete request that can be found in the above mentioned link. Particular attention should be paid to the following sections: baseline setting, past and ongoing efforts, as well as post-assistance plans and actions.

Once the contract is signed, the CTCN will organize a kick-off call between all parties involved in the request to introduce the Contractor to the NDE in Panama, to present the activities and timeline and clarify roles and responsibilities.



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The Contractor is expected to undertake the following activities:

Output 1: Development of response plan

Activity 1.1: In-country planning mission: this inception mission aims to:

- Clarify activities and verify transport data availability with the NDE, project proponent (and local transport authorities as needed);
- Initiate the drafting of the response plan.

Activity 1.2: Development of response plan: Preparation of the response plan, in accordance with the requirements set out by the CTCN's TOR, including :

- Data and information collection and reviewing;
- Stakeholder consultations and integration of their recommendations in the response plan design;
- Assessment of ongoing projects/ programs active in the recipient country in order to get a clear picture of the current baseline;
- Proposed activities/ interventions needed to address the identified transport issues;
- Project baseline including information on policies, plans and programmes that are active in the country, highlighting opportunities for synergies and coordination.
- Logical framework to summarize the project outputs and activities including the budget and timeline in accordance to CTCN Response plan template.

Deliverable output1:

- *D1: Detailed CTCN Response Plan*

Output 2: Transport model definition: evaluation of operating conditions for transit buses in Panama

There are currently a number of competing technologies for buses and infrastructures (e.g. electric charging systems) that have different performance levels, depending on traffic conditions and routes. In order to successfully implement the most suitable technology for Panama city, it is necessary to determine the driving parameters and conditions affecting their performance.

Activity 2.1: Monitoring of a pilot electric bus service

Monitoring the energy efficiency of a pilot bus route under real traffic conditions for one electric bus (built by BYD) currently running in the historical city centre. The monitoring process should collect information at least for the following driving conditions: energy consumption over the real route (driving cycle) operated by the bus; batteries charging status and main driving parameters characterizing the dynamic behavior: speed, acceleration/braking, throttle, etc.

The monitoring shall use an on-board monitoring system and/or device, applying international protocols and measurement standards.

The transport database available within the municipality and the transport authorities (including previously executed international transport studies) should be sufficient to define a baseline scenario able to inform the preparation of the transport model as regards the main municipal area.

Activity 2.2: Identify the most suitable technology for Panama City

Based on the results of activity 2.1, the transport model and its calibration on the specific case study of Panama city are set up. The model (based on a software tool) will allow to evaluate and define the most appropriate bus configurations (and relating technologies, i.e. NG, Electric) - including the necessary



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infrastructure for Panama City.

The historical center area and the main city area may require different buses typologies, both in terms of energy system and size. For instance, the narrow streets of the very center may privilege smaller, zero-emission and low noise vehicles, while the remaining metropolitan area may be suitable for high capacity solutions, e.g. Bus Rapid Transit (BRT), etc.

Furthermore the transport model should suggest accompanying transport measures to complement the bus system, for instance bike lanes and other solutions to improve the overall public transportation flows.

While comparing and proposing different transport technologies, an evaluation of the polluting emissions, and the tons of CO₂ associated with the chosen solution, has to be provided.

Activity 2.3: Economic, environmental and social assessment impact of different bus configurations

Determine the full economic, environmental and social impacts of the deployment of different and rates of buses in Panama. Electric buses, Euro VI and natural gas buses capital cost comparison, operating cost comparison and total life-cycle cost comparison.

Deliverables output 2:

- *D2.1 - Definition of the parameters to be monitored in the pilot project and analysis of the monitoring results in the pilot project with conclusions.*
- *D2.2 - Report with a recommendation of the most appropriate technology for Panama.*
- *D2.3 - Economic, environmental and social assessment.*

Output 3: Transport plan draft proposal

Activity 3.1: An overview of the types of alternative fuel technologies available for implementation in public buses fleets and diagnosis of the transport system in Panama will be proposed. Compilation of international experiences on environmental considerations of transit bus fuel and technology choice, including four important issues for Panama: energy and service efficiency, air quality, climate change as well as investment requirements.

It is essential to take as reference similar experiences already existing in different parts of the world to ground the methodology to be applied and to be able to evaluate the strengths and weaknesses of available technologies such as EVs, natural gas and/or Euro VI buses, etc. Studies implemented regionally in Latin America and the Caribbean (LAC) as well as locally in LAC and other countries with similar characteristics should be analysed. The output will be a technical report summarizing the analysed experiences and assessing the variables associated with the transport system used in other countries and the recommendations for Panama. This information can also be used for future technical assistance in other countries.

Activity 3.2: Revision and update of existing databases

The objective of this activity is to review the existing transport databases and identifying the existing gaps. The output will be a report with recommendations for the set up and operation of the database for Panama City.

Activity 3.3: Diagnosis of the transport system in Panama

Through the developed transport model (output2), the mobility plan will be articulated into three main scenarios: short, medium, long-term. In consultation with the main stakeholders, the most adequate



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combination of transport solutions will be proposed in order to enhance the urban mobility of passengers. Identification of possible integration schemes for goods transport flows into the mobility study can represent an added value.

There are a number of risks and barriers associated with the deployment of new technology buses in Panama. These include regulatory, commercial, financial and operational structures that have been developed to promote or enforce the operation of conventional diesel buses.

For the introduction of new buses technologies, the transport plan needs to identify and analyse those aspects and relating operational barriers in order to develop mitigating measures and reduce any potential risk for their correct implementation.

Deliverables output 3:

- *D3.1 - Document summarizing international experiences and recommendations for Panama*
- *D3.2 - Document summarizing recommendations for databases*
- *D3.3 - Diagnosis of the transport system in Panama, including an economical evaluation of subsidies and real operational costs of the current system and of the proposed solutions.*

Output 4: Capacity building

Activity 4.1: Final workshop with all relevant stakeholders: The objective of this activity is to develop the work of technology and knowledge transfer associated with the technical assistance: Final workshop for Panama operators and other stakeholders involved.

The workshop will present the results of the study and the methodology utilised to define the transport model. Addressees of the workshop are bus operators, service providers' energy secretary, municipality and other relevant stakeholders. This workshop will also serve as a public consultation process for the finalisation (design and structure) of a transport plan to deploy and upscale the most suitable technologies for Panama city, making sure to incorporate a participatory approach to the program.

Activity 4.2: Training on the transport model (for specialised transport personnel):

This training module (up to 15 persons) is dedicated to specialised transport personnel within relevant transport Authorities and Ministries so to enable full control and management of the developed transport software tool. The country's capacity to perform an environmental, economic, social and health impact evaluation through the proposed transport model will be also described. Key recommendations on how to strengthen the technical knowledge of the country to implement, operate and maintain the transportation system (buses, infrastructures) will also be provided.

Deliverables output 4:

- *D4.1 – Report on the final Workshop with all relevant stakeholders and Final transport plan (agreed by all stakeholders)*
- *D4.2 - Training material and report on the specialised training*

Output 5: Monitoring and evaluation

Deliverables output 5:

D5.1 - One page description of intended outcomes and impacts from this technical assistance, drafted at initiation of implementation and revised at closure, using a template provided by the CTCN. (in



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English)

D5.2 - A technical assistance 'Closure and Internal Information Report' using a template to be provided by CTCN (in English)

D5.3 - A monitoring and evaluation plan using a template provided by CTCN (in English)

4 GENERAL TIME SCHEDULE AND ACTIVITY/DELIVERY PLAN

The activities under this contract have an expected duration of twelve (12) months from the contract signature. The proposed plan for the implementation of activities and deliveries:

	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
Output 1												
Activity 1.1												
Activity 1.2												
D1		X										
Output 2												
Activity 2.1												
D2.1			X									
Activity 2.2												
D2.2						X						
Activity 2.3												
D2.3						X						
Output 3												
Activity 3.1												
D3.1							X					
Activity 3.2												
D3.2							X					
Activity 3.3												
D3.3									X			
Output 4												
Activity 4.1												
D4.1											X	
Activity 4.2												
D4.2											X	
Output 5												
D5.1												X
D5.2												X
D5.3												X

All draft and final deliveries are subject to approval by the CTCN Climate Technology Manager, before these can be considered as completed.



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5 PERSONNEL IN THE FIELD (PROFESSIONAL EXPERIENCE AND QUALIFICATIONS)

The Contractor is expected to provide the services of a team that should ideally comprise the following competencies:

- Master's degree in transport/environmental/industrial/automotive engineering, energy technologies or similar.
- A minimum of 10 years relevant work experience in natural gas powered vehicles, e-mobility, EV technologies and alternative systems for transportation.
- Demonstrated experience in climate change project development, implementation and management.
- Demonstrated experience and hands-on experience in technology dissemination in terms of comparing and proposing different transport technologies.
- Demonstrated experience on transport planning and charging stations for EV.
- Demonstrated experience in advising the design of public transport plans and regulatory frameworks.
- Ability to pick up new terminology and concepts easily and to turn information from various sources into a coherent outcome.
- Previous work experience in Central America is required (preferably in Panama).
- Excellent written and communication skills in both English and Spanish.

6 LANGUAGE REQUIREMENTS

The working languages for the purposes of this assessment are Spanish and English, thus an excellent command of both is required for the proposed personnel. All delivered documents must be of such a quality, that no further editing shall be required.