Monitoring & Evaluation (M&E) Plan and Impact Statement Form

Objective of the M&E Plan and Impact Statement:

- The M&E Plan and Impact Statement must be designed based on the Technical Assistance Response Plan and must enable the Implementer to complete the Closure Report at the end of the assistance.

Process for filling in the form:

- The Implementer must identify relevant quantitative and qualitative indicators as specified in the Closure Report. A sub-set of indicators to monitor and assess must be chosen among these.
- The Implementer may also identify other specific, measurable, achievable, relevant, and time-bound indicators suitable to monitor Activities, Outputs and anticipated Outcomes from the technical assistance and add to the M&E Plan and Impact Statement.
- During implementation of the TA or FTA, the Implementer must collect all relevant data as described in the Monitoring & Evaluation Plan. Aggregated data on selected indicators as well as an updated version of the Impact Statement will be presented in the Closure Report at the end of the assistance.

Basic Information	
Title of response plan	Development of Framework for Real-Time Transport Information Systems for Public Transport in Greater Dhaka area.
Technical assistance reference number	-
Country/ countries	Bangladesh People's Republic (Bangladesh)
NDE focal point and organisation	NDE: Dr Abdul Hamid Director General Department of Environment, Ministry of Environment, Forest, and Climate Change Email: dg@doe.gov.bd Focal Person: Colonel Zahid Hossain Director (Technical) Bangladesh Road Transport Company (BRTC) Email: zahidbrtc@gmail.com
Sector(s) addressed	Low-carbon transportation (mitigation)

Technologies supported	Automatic Vehicle Location (AVL), Real-time Passenger Information (RTPI), Bus Management Systems (BMS)
Implementation period and total duration	October 2022 – October 2023
Total budget for implementation	$270,800 USD
Designer of the response plan	Korea National University of Transportation
Implementer of response plan	Korea National University of Transportation

(A) Outputs and Activities as described in the Response Plan	(B) Indicator	(C) Expected results	(D) Method and frequency for data collection	(F) Comments
	Select relevant indicators from the Closure Report (at least one core indicator, section B). You may also define additional relevant indicators to be added.	*Add the expected quantitative or qualitative target/value of the indicator (e.g. number of studies, policy recommendations, etc.).*	*Describe the expected method and frequency for data collection (e.g. survey, head count at a training workshop, application of a standard methodology etc.)*	*Describe any assumptions made or anticipated challenges for collecting quantitative and qualitative data*
1: Development of implementation planning and communication documents	*N/A*	*N/A*	*N/A*	*N/A*
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Activity 1.1: Detailed work plan of all activities, deliveries, outputs, deadlines	*N/A*	*1 workshop attended by minimum 2 attendees Will result in a net increase in GHGs (1 tonne x 2) = 2 tonnes CO2e*	*N/A*	*N/A*
Deliverable 1: i) Detailed work plan ii) Monitoring and evaluation plan iii) CTCN Impact Description iv) Closure and Data Collection report	*N/A*	*4 deliverables (see first column)*	*N/A*	*N/A*
2: Establish a Baseline (Baseline/Existing Conditions)	*N/A*	*N/A*	*N/A*	*N/A*
Activity 2.1: Summarize existing reports	*Transport*	*Review of 3 related plans*	*Collected from various online sources by internet key word searches*	*N/A*
Activity 2.2: Undertake data collection	*Transport*	*Collect data from available sources Google Maps API and GTFS*	*GTFS for all of Dhaka, Google API travel times for all of Dhaka*	*N/A*
Activity 2.3: Data Analysis	*Transport*	*N/A*	*Various*	*N/A*
Activity 2.4: Write Baseline/Existing Conditions Report	*N/A*	*N/A*	*N/A*	*N/A*
Deliverable 2: Baseline/Existing Conditions Report	*N/A*	*N/A*	*N/A*	*N/A*
3: Design of the Bus Management System (BMS)/Bus Information System (BIS) Architecture				
Activity 3.1: Technical Specifications: BIS	*Transport*	*1 transport model, calibrated*	*Calibrated data collected from Korean government sources*	*N/A*
Activity 3.2: Technical Specifications: BMS	*Transport*	*Specifications for all buses in the Dhaka area*	*N/A*	*N/A*
Activity 3.3: Technical Specifications: Communications and ICT Architecture	*Transport*	*Specifications for all buses in the Dhaka area*	*N/A*	*N/A*
Activity 3.4: Data and Information Review (BIS)	*Transport*	*N/A*	*N/A*	*N/A*

(A) Outputs and Activities as described in the Response Plan	(B) Indicator	(C) Expected results	(D) Method and frequency for data collection	(F) Comments
	Select relevant indicators from the Closure Report (at least one core indicator, section B). You may also define additional relevant indicators to be added.	*Add the expected quantitative or qualitative target/value of the indicator (e.g. number of studies, policy recommendations, etc.).*	*Describe the expected method and frequency for data collection (e.g. survey, head count at a training workshop, application of a standard methodology etc.)*	*Describe any assumptions made or anticipated challenges for collecting quantitative and qualitative data*
Activity 3.5: UX Design, Look and Feel Concept (Human Factors)	*Transport*	*N/A*	*N/A*	*N/A*
Activity 3.6: Software and GTFS-Realtime Review	*Transport*	*N/A*	*N/A*	*N/A*
Activity 3.7: Geographic Review	*Transport*	*Number of recommended stops (bi-redactional), and their geographic locations*		
Activity 3.8: Administrative and Governance Review	*Transport*	*N/A*	*N/A*	*N/A*
Deliverable 3: Draft and Final System Architecture Report	*Transport*	*1 report*	*N/A*	*N/A*
4: Costing (Estimation)	*Transport*	*N/A*	*N/A*	*N/A*
Activity 4.1: Costing of the BIS and BMS equipment	*Transport*	*Costs for all components*	*N/A*	*N/A*
Activity 4.2: Costing installation/construction	*Transport*	*N/A*	*N/A*	*N/A*
Activity 4.3: Costing of the software development & database maintenance	*Transport*	*N/A*	*N/A*	*N/A*
Activity 4.4: Costing of the operation, data management, and software	*Transport*	*N/A*	*N/A*	*N/A*
Deliverables 4: Costing Report	*Transport*	*N/A*	*N/A*	*N/A*
5: Bus Reform	*Transport*	*N/A*	*N/A*	*N/A*
Activity 5.1: Preparation for Webinar on Bus Reform	*Transport*	*1 2-hour webinar*		
Activity 5.2: Webinar on Bus Reform: April 13 (TCB)	*Transport*	*1 2-hour webinar*		
6: Concept Note for the next steps of this Project	*Transport*	*N/A*	*N/A*	*N/A*
Activity 6.1: Prepare Concept Note, based on Green Climate Fund (GCF) target	*Transport*	*1 concept note (1-2 page)*		

Note: The Response Plan may contain information useful for the section below. The information in the table below will be used by the CTCN for public communication of the achieved and expected results of the Technical Assistance through the CTCN website www.ctc-n.org and other communication channels. See for example: https://www.ctc-n.org/sites/www.ctc-n.org/files/benin_a_ag_forestry.final_.pdf

Impact Statement	
Challenge	*Dhaka is a megacity in Bangladesh home to over 21 million people in a relatively small area making it one of the most densely populated places on earth. With rising population and economic growth, the GHG emissions in Bangladesh from the transport sector have been increasing since at least 2013 and is responsible for at least 15% of CO2 emissions from energy-related sectors. Bangladesh is committed to reducing its GHG emissions in the power, industry, and transport sectors by 5% by 2030, or by 15% if sufficient and appropriate support is received from developed countries. The transport sector would contribute a 9% reduction in GHG emissions by 2030 or 24% if support is received from developed countries (Ministry of Environment, 2018). Further, the city suffers from incredible traffic congestion and the privately-operated bus-based public transport system is inefficient and insufficient for the city's population.*
CTCN assistance	• *In this TA, we will help Bangladesh achieve its goals by developing a framework for real-time bus tracking technology which will greatly increase the convenience and practicality of public transport in Dhaka.* • *We will develop a baseline (knowledge), design of the overall system architecture including information to offer etc., and design the technical specification, we will also develop cost estimates for equipment & software etc. based a number (3) scenarios.*
Anticipated impact	*By taking the first steps to establishing a framework, this TA will develop an architecture and implementation plan to introduce real-time bus information systems (BIMS) to the public transport network in Dhaka. As such, the plan will allow the entire public transport network to be greatly improved in terms of its accessibility and convenience, and therefore make it more competitive against other competing, generally fossil-fuel-based private or pseudo-private, modes such as CNGs, private cars, and motorcycles. Over time, this could reduce the amount of GHG emissions from transport within the Dhaka area, and importantly, hopefully encourage people to not buy new cars and motorcycles.*
Anticipated co-benefits from the TA	*With investment in public transport, and transport more generally, there will be significant co-benefits in terms of increased economic opportunity which will lead to economic growth., This is especially true in places with underdeveloped public transport networks, like Dhaka.*
Gender aspects of the TA	*In this public bus system, both female/vulnerable group operators/users are more adversely affected in less accessible areas. Women and children faced difficulty to travel to school, work, and hospitals. In Dhaka, there has long been debate around Women's safety on public transport, and some women do report harassment and feeling unsafe o busy buses. In addition, women have different travel characteristics and needs. Hence, geographic targeting,*

	and a more nuanced understanding of women's needs (including safety issues) is needed to increase the access of those users in designing and sharing this real-time information for wider adoption. *This TA will contribute to improving the service of public transport at large in Dhaka. Women suffer from significantly lower income then men with poor access to labour market, will thus in particular benefit from more efficient mobility services in terms of increased access to employment, markets, education, and health services, but also to the caretaking and household responsibilities that most women hold.*
Anticipated contribution to NDC	*Bangladesh has updated its Nationally Intended Contributions (NDCs) as of August 2021. These include pans to improve fuel efficiency of transport by 5% and address road congestion issues. In addition, Bangladesh' NDC document projects its total GHG emissions to increase from 169.05 MT CO2e in 2012 to 409.4 MT CO2e in 2030, of which transport would account for around 9%, under the Business as Usual (BAU) scenario. With mitigation policies and projects in place, Bangladesh assumes projects a total reduction of up to 21.85 MT CO2e by 2030 compared to the BAU scenario.* *This TA will contribute to the GHG reduction targets set by Bangladesh by targeting an increase in usage of the public transport network, which should lead to a "mode shift" from primarily fossil-fuel-based private or pseudo-private transportation to more efficient buses, as the public transport becomes more convenient and usable for potential users. At the same time, this TA will, because of the same reasons, help to tackle the extreme traffic conditions that consistently plague Dhaka.*
The narrative story	*This TA is a planning study, to develop an architecture plan including software, and placement plans for a bus management systems/bus information system in Dhaka. As such, this study allows for follow-on work to be undertaken using the architecture plan developed. Since this TA will develop costing estimates, and potentially funding arrangements, Bangladesh departments will be well-prepared to develop budgets, estimates, and tender documents to get potential private sector bidders to undertake the actual installation and development of the BIS/BMS.* *First, we will (1) understand the base conditions, including traffic congestion, travel times, understanding the bus networks, operating companies, and future plans for Dhaka. With this understanding, we can begin to develop and architecture and plan for the implementation of the real-time tracking systems. For example, if any such systems exist, what are their specifications and where are they being use? (2) We will then develop architecture plans and technical specifications for the equipment and software, which will be based on compatible Korean systems that have seen wide success here in Korea (3) We will develop reasonable capital and annual maintenance cost estimates for the equipment and software which will also be based on Korean experience. (4) We will host a webinar to discuss how the bus system can be reformed more generally, which may be required before a tracking system can be effectively used.* *Finally, we will report our results to the main client, the BRTC. However, it should be noted that the framework will consider that the system will be applied to all buses in the Greater Dhaka area, not just BRTC ones. Korean companies may be well-poised to provide and install the equipment necessary for a modern and effective BIS/BMS system in Dhaka. Follow-on work involving our network of Korean companies could be undertaken.*

Contribution to SDGs	• *9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation: This TA will identify infrastructure needs in Dhaka, and provide opportunity for the private sector to implement the solutions, and innovate while doing so.* • *11. Make cities and human settlements inclusive, safe, resilient and sustainable: The long-term impacts of this TA will bring the population in Dhaka both economic and health benefits.* • *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: This TA will assist Bangladesh in reducing its dependence of fossil-fuel-based transportation while promoting more efficient usage of their roadways.*
Reference to knowledge products	*Please indicate if any UNFCCC Technology Executive Committee (TEC) knowledge products (publications, briefs, tools etc.) were used in the development of the TA request and/or are envisaged to be used during implementation of the technical assistance.* *Link to TEC knowledge database:* *https://unfccc.int/ttclear/tec/documents.html* *Which knowledge products do you envisage to use? Please list*