# Technology foresighting for a low-carbon Havana public transport system

## Background and objectives

Havana is at a critical juncture, with economic reforms stimulating the growth of motorised transport that will, if unchecked by a far-sighted mobility strategy, cause rising congestion, air pollution and road deaths, as well as community severance and loss of pedestrian accessibility. Its Dirección General de Transporte (DGT, unitary transport authority) is working to develop a ‘Sustainable Urban Mobility Plan’ (SUMP), supported by engagement with a multi-disciplinary policy-oriented research project involving University College London and CUJAE (Havana’s technology university).

Acknowledging its need to access external research and expertise for the preparation of a fully-informed SUMP, the DGT has requested support. This proposal responds to that request, by providing CENEX expertise on the availability and relative costs of public transport vehicle and system technologies (for diverse mobility services) and their likely trajectories. In liaison with UCL and CUJAE specialists (providing guidance on the Cuban context and coordination with, and access to, relevant authorities), CENEX will deliver a succinct, valuable guidance for the DGT – which can be shared with other Cuban transport authorities – to inform its sustainable urban mobility development plan.

## CENEX consultancy

Cenex operates as a not for profit consultancy and research organisation specialised in low carbon\low emission vehicle technologies including technology foresighting and procurement advice to public and private sector fleet operators.

Technology foresighting is commonly applied both by technology developers (via technology roadmaps) to decide where to focus research funding and by end user organisations looking for technology solutions to adopt to satisfy unmet needs and/or to boost competitiveness. Cenex has experience in both aspects of technology foresighting and specifically to applying technology foresighting to forecast the availability of new low carbon vehicle technologies for public and private sector fleet operators, including the rate of introduction and financial viability.

The key to this project lies in developing technology foresighting maps for new technology introduction and uptake in public transport applications and then working with the relevant stakeholders within Havana to identify and align potential procurement demand around innovative solutions identified in these roadmaps. This is a process Cenex has applied to commercial fleets for vans and truck applications and can apply here for public transport.

# Project approach

The consultancy is to be delivered as a series of linked Work Packages.

## **ACTIVITY 1**

## Work Package 1. Project launch and project management

To commence the project a Project Initiation Document (PID) will be prepared containing a list of project goals, risks, and questions that need to be answered at, or soon after, project inception.

## Work Package 2. Technology Foresighting

### Subtask 1. Literature review

This Work Package will use Cenex’s knowledge base and library to review and collate appropriate low/zero emission vehicles and infrastructure technologies for city mobility. The focus will be on key applications, from foresighting to pre-procurement. The proposal is therefore to focus on vehicle and infrastructure technologies for:

* City buses
* Car clubs (specifically EV car clubs)
* Taxis
* Bicycle schemes (specifically E-bikes)

### Subtask 2. Roadmap development

Cenex’s experts will review the outputs of subtask 1 to produce a proposed timetable of technology scenarios at current, 5 & 10 year horizons and the various cost and policy implications. Cenex has developed an approach for this whereby roadmaps are translated into a series of ‘traffic light’ assessments which provide a comparison of innovative urban vehicle technologies with the incumbent using the following criteria:

* Red: worse (environmentally, economically) than the incumbent
* Amber: comparable (environmentally, economically) to the incumbent
* Green: better (environmentally, economically) than the incumbent

This presentation has proven invaluable in Cenex foresighting work for public and private fleets, proving a simple visual presentation of technology applicability and how it can evolve over time.

## **ACTIVITY 2**

## Work Package 3: City Stakeholder Engagement

This Work Package will focus on data collection from and benchmarking of public transport operations within Havana, based on parameters including:

* number of vehicles
* types of vehicle
* public transport operations
* in-house and procurement\vehicle replacement cycles and future
* performance and policy priorities (environmental, operational, etc.)

A structured questionnaire will be developed, in order to ensure that the data collected can be benchmarked across the relevant Havana networks, an approach that has been proven across multiple Cenex city fleet engagement projects. It will include a section on a summary of the outputs of WP2 in order to check its results and to benchmark the level of technological understanding and ambition within each stakeholder.

## **ACTIVITY 3**

## Work Package 4: Expert Engagement

.

Cenex will use its network of contacts in the EU, UK and US transport technology provider communities to verify the outputs of the technology foresighting work carried out in Work Package 2, particularly in terms of technology and vehicle deployment timelines for the next 10+ years. A complete list of suppliers consulted will be provided, but it is anticipated that at least ten current/potential suppliers of low carbon vehicle technologies will be consulted.

The outputs of this exercise will be a refined version of the traffic lighting output of WP2 which will feed into the next work package on alignment of supply and demand.

## Work Package 5: Alignment of Supply and Demand

This Work Package will use the outputs of the previous Work Packages to assess the scale of demand for future low emission mobility technologies and map it to the technology development and deployment timescales of suppliers. This is essential if demand is to be aggregated across the public sector demand side.

## **ACTIVITY 4**

## Work Package 6: Analysis and Reporting

Work Package 6 will present a final report of the finding of the study, including:

* A comprehensive summary of the technology foresighting work, with comprehensive text as well as traffic light summaries (WP2)
* Summarised city engagement (WP3)
* Summarised supplier engagement (WP4)
* Alignment and aggregation of supply and demand, including optimum timescales for vehicle deployments
* Supplier contact details