E-mobility in public transportation in Kathmandu

Pilot Project Concept

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Nepal
Kathmandu

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The Urban Pathways project helps to deliver on the Paris Agreement and the NDCs in the context of the New Urban Agenda and the Sustainable Development Goals. It has established a facility in close cooperation with other organisations and networks active in this area to support national and local governments to develop action plans and concrete implementation measures to boost low-carbon urban development. This builds on UN-Habitat's role as "a focal point on sustainable urbanisation and human settlements including in the implementation and follow-up and review of the New Urban Agenda". The project develops national action plans and local implementation concepts in key emerging economies with a high mitigation potential. The local implementation concepts are being developed into bankable projects, focusing on the access to urban basic services to create a direct link between climate change mitigation and sustainable development goals.

The project follows a structured approach to boost Low Carbon Plans for urban mobility, energy and waste management services that deliver on the Paris Agreement and the New Urban Agenda. The project works on concrete steps towards a maximum impact with regards to the contribution of urban basic services (mobility, energy and waste management) in cities to global climate change mitigation efforts and sustainable and inclusive urban development. This project makes an active contribution to achieve global climate change targets to a 1.5°C stabilisation pathway by unlocking the global emission reduction potential of urban energy, transport and resource sectors. The project will contribute to a direct emission reduction in the pilot and outreach countries, which will trigger a longer term emission reduction with the aim to replicate this regionally and globally to make a substantial contribution to the overall emission reduction potential.

This project implements integrated urban services solutions as proposed in the New Urban Agenda providing access to jobs and public services in urban areas, contributing to equality and social coherence and deliver on the Paris Agreement and the Sustainable Development Goals. This is the first dedicated implementation action oriented project, led by UN-Habitat to deliver on inclusive, low-carbon urban services. Securing sustainability and multiplier effect, the project aims to leverage domestic and international funding for the implementation projects that will follow from this initiative.
Kathmandu overview

Kathmandu is Nepal’s capital and the largest city in the country. The Kathmandu valley includes 3 cities – Kathmandu, Lalitpur and Bhaktapur with a combined population of more than 2.5 million. Nepal’s GDP per capita is US$835 (2017) and the country’s CO2 emission is about less than 0.1% of global emissions (as of 2010). Nepal does not have fossil fuel reserves so relies on imports. The majority of Nepal’s electricity is from hydropower generated within the country. Road transport dominates transport infrastructure in Nepal and the vehicle (private) registration is increasing tremendously, causing air pollution and health impacts. According to recent data, public and private vehicles, excluding commercial vehicles (like trucks and mini trucks, construction machines), have CO2 emissions of about 4.5 million tonnes per year nationwide, and 1.9 million tonnes in the Kathmandu valley.

There are 700 E-3-wheelers used for public transportation (named Safa Tempo), but these are using lead acid batteries that require frequent charging, inability to operate safely at night, etc. Buses that run on diesel are one of the main modes of public transportation in the valley, and the city is planning to introduce E-buses/E-Minibuses in the near future. Few privately owned E-scooters run in the city. Now the challenge is to set up an overall eco-system for clean electric public transport consisting of various types of electric vehicles such as buses, microbuses, taxis, e-scooters, and charging stations. This project will contribute to this goal by demonstrating the use of the use of different e-vehicles as public transport in Kathmandu, and appropriate charging systems and stations in Kathmandu.

1 https://climateactiontracker.org/countries/nepal/
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In Kathmandu, a demonstration action will contribute to create an ecosystem for electric mobility by demonstrating different EVs to enhance public transport, suitable charging solutions and services. It will support the integration of several innovative last-mile solutions such as 30 new and 50 remodelled E-3-wheelers (for public transport) and 20 E-scooters (provided by the city/Valeo) with 5 E-minibuses, (e.g. 8 meter length) (co-funded by the city), the buses in use currently and forthcoming E-buses. 2 diesel buses will be converted to E-buses replacing the drive system (motor, transmission and rear axle) and the suitable business model will be developed. The E-buses/E-minibuses and E-3-wheelers (refurbished and new with an innovative Valeo 48V all-electric prototype) are planned to run on the existing routes.

As charging infrastructure is poor or non-existent in public, suitable options for charging EVs and batteries will be suggested. E-buses and E-minibuses with Lithium-ion (Li-ion) battery large enough to allow for the daily operation (without charging) up to 14 hours will be sought, together with charging strategies such as plug-in overnight charging located in the depot. Several existing E-3-wheelers will be remodelled - mainly converting lead-acid batteries into Li-ion batteries and refurbishing the chassis, assembling the vehicle parts locally. New E-3-wheelers with Li-ion batteries and fast charging system will be introduced together with innovative business model, such as battery leasing/pay-per-use model. This will provide better services for E-3-wheelers as public transportation in the city. E-scooters sharing system, that reduce the dependence on owning private vehicles, will also be sought in the demonstration project with state-of-the-art technologies such as GPS positioning, contactless payments and 2 docking stations integrated into charging facilities.

The demonstration also supports promotional activities to raise awareness on EVs, introduce integrated electronic payment system with smart card (in public transport) and smart services for fleet management including an improved information system as well as proper operation and maintenance of vehicles (MaaS App). The demonstration will also explore the feasibility to integrate renewables and improve the profitability of the charging business, such as Vehicle to Grid (V2G) applications, and business model on energy integration.
Project demonstration activities

- Piloting innovative technology (battery swapping, range extension) and charging infrastructure.
- Numbers of Refurbished (Safa Tempos) and new E-3-wheelers, shared E-scooters, converted diesel bus to E-buses and E-minibuses running on existing routes.
- Identification of appropriate business models for EV charging infrastructure and services (such as battery leasing and overnight charging), carried out in the feasibility study.
- Promotional activities, such as conducting various campaigns to raise awareness on and demand for EVs
- Integrated electronic payment system with smart card, introduced in public transport
- Fleet management, including an improved information system as well as proper operation and maintenance of vehicles

Local, Industry, knowledge and implementation support partners

The planned project activities will be coordinated and supported by a local cooperative public transport organisation in Nepal - the 'Sajha Yatayat' in collaboration with municipalities, government departments, the private sector, technical education institutions, banks, and local NGOs.

Project tentative plan for demonstration action

Within €500,000 budget for the demonstration activities in Kathmandu, E-3-wheelers (50 refurbished and 30 new), E-bus (2 refurbished), E-minibus (5) and shared E-scooters will be introduced the total worth of €100,000, €100,000, €75,000 and € 70,000 respectively by providing depreciation/leasing cost during the demonstration period. The rest (€155,000) will be planned for charging solutions (such as Li-ion batteries and battery swapping/battery leasing for E-Tuk-Tuks, plug-in overnight charging for E-Buses/E-Minibuses and docking-cum-charging for E-scooters), promotional activities, smart electronic payment and fleet management. The number of vehicles and the budget plans for the vehicles, charging solutions and services is indicative.
Project Financing and implementation

The proposed demonstration project concept on ‘E-mobility in public transportation in Kathmandu’ was developed under Urban Pathways project and was submitted on 25 April 2019 as a part of EC H2020 proposal for funding. The technical support on project proposal development and activities, provided by “Urban Pathways” project, was funded by the International Climate Initiative and implemented by UN-Habitat, Wuppertal Institute and UN Environment.
Policy environment supporting electric mobility in Kathmandu

Many national policies favoring EVs exist in Nepal. Nepal’s NDC aims to increase the share of EVs up to 20% by 2020 from the 2010 level and decrease its fossil fuel dependency by up to 50% in 2050 by promoting effective public transport, energy efficiency and EVs. Nepal’s financial and fiscal regulations are favourable to electric vehicles. Beside the provision of bank loans of up to 80% to EVs, the import tax of EVs for private purposes is 28% and for public purposes is 21% and no annual taxes for EVs (while 248% for conventional vehicle import including custom duty, VAT and road tax etc.). The government of Province 3, in which the Kathmandu Valley is located, and the municipalities of the Kathmandu Valley (e.g. Lalitpur Municipality) have plans for EV promotion in the city.