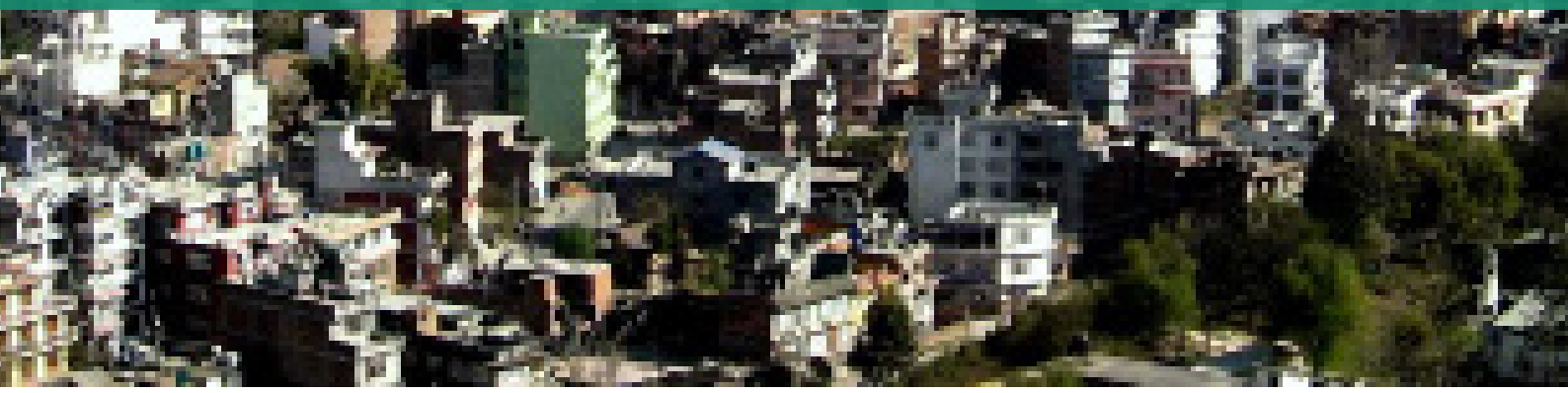
KATHMANDU, NEPAL

SOLUTIONSPLUS I LIVING LABS UPDATE



This project has received funding from the European Union Horizon 2020 research and innovation Programme under grant agreement no. 875041

PROJECT PARTNERS

ABOUT

This is a summary of the paper, submitted to the journal 'Sustainable Earth Review' developed under SOLUTIONSplus project. Currently the paper is under peer review.

TITLE

Capacity and market potential for local production and distribution of electric two-wheelers in Southeast Asia, focused on Thailand, Indonesia, and Vietnam

PREPARED BY

Hyung Ju Kim, Wuppertal Institute (Visiting scholar)/ National Institute of Green Technology Korea
Shritu Shrestha, Wuppertal Institute
Kanya Pranawengkapti, Wuppertal Institute

FINANCIAL SUPPORT

Solutionsplus

DISCLAIMER

The views expressed in this publication are the sole responsibility of the authors named and do not necessarily reflect the views of the European Commission.

LAYOUT

Yasin Imran Rony, WI

PICTURES

All the pictures are provided by the ITDP

June, 2024

KATHMANDU, NEPAL

The SolutionsPlus project aimed to accelerate the transition to sustainable urban mobility through innovative and integrated e-mobility solutions. To this end, the consortium partners created Living Labs at city level to test different types of innovative and integrated e-mobility solutions. Living Labs reach beyond the implementation of technological innovations and also include elements of information, inspiration and initiation to achieve a stronger and sustainable impact of the project activities.

INFORM

Boost capabilities of local and national authorities, public transport operators and entrepreneurs about innovative urban e-mobility solutions across various transport modes by **informing them about tools** to plan, assess, implement and operate e-mobility solutions.

INSPIRE

Foster the take-up of e-mobility innovations by businesses, start-ups, local and national governments and transport operators by **inspiring** officials, operators, industry and businesses through peer-to-peer exchange on innovative e-mobility products and services.

INITIATE

Strengthen policy and business **collaboration** by **initiating** partnerships between local and national governments and local and European entrepreneurs and supporting the development of new e-mobility models business implementation plans.

IMPLEMENT

Create reference models for e-mobility innovation by **implementing** demonstration actions to test innovative e-mobility technologies and services, foster their **replication** and ensure their long-term **sustainability**.

IMPACT

Contribute to global **sustainability and climate goals** by boosting the **impact** of this project through the integration of the innovative concepts into policy, funding, operation, research and business practice.

Kathmandu, the capital city of Nepal, home to approximately 1.5 million people and is experiencing a rapid growth in the recent years.The city serves as the economic center of Nepal, hosting a variety of industries, businesses, and services. Its economic growth is primarily driven by trade, tourism, and the service sector.

However, with the growing urbanisation and higher incomes the demand for vehicles is increasing in Nepal, resulting in increased congestion, air pollution and associated health impacts. The city's location in a basin reduces air exchange and worsens pollution levels on many days.

Emissions from combustion vehicles is one of the main sources of air pollution. According to the Department of Transport Management (DoTM 2019), the number of total vehicles registration yearly grew by 16% annually during 1990-2018. The number of buses in Kathmandu increased from 4,000 units in 1990, to more than 35,000 units in 2015. This category includes full size buses, minibuses, microbuses and three-wheelers,

called tempos. According to recent data, the national public and private vehicle fleet, excluding commercial vehicles (like trucks and mini trucks, construction machines), contributes about 4.5 million tonnes CO2 emissions per year, and 1.9 million tonnes in the Kathmandu valley.

DEMONSTRATION ACTION IN KATHMANDU

The Demonstration action aimed to contribute to creating an electric mobility ecosystem in the Kathmandu valley to enhance public transport and to mitigate emissions for greenhouse gases and air pollutants. Components included a variety of interventions, including: the conversion of a diesel bus into an electric bus, the remodeling of existing e-3 wheelers (Safa tempos) for passenger and cargo services, the new design of e-3 wheelers with a multi-use concept (passenger, cargo, and waste), the design of an e-shuttle van, and potential improvement of vehicle integration services with the introduction of the cashless payment system.

INFORM

Knowledge products related to demo activities and e-mobility in general, such **as e-buses, vehicle retrofitting, light electric vehicles, urban logistics, charging infrastructure, and vehicle integration**, were incorporated into the SOLUTIONSplus online toolbox and shared with the city. These have supported Kathmandu in better understanding technical and planning aspects of the transition to e-mobility, as well as policy approaches.

INSPIRE

Kathmandu stakeholders benefited from online and on-site trainings. Activities targeted at enhancing knowledge and capabilities of stakeholders related to e-mobility solutions.

In May 2021, **a first regional training for Asian cities** was conducted, focusing on the contribution of e-mobility and integrated urban mobility planning to achieving the SDGs in Asian cities. Due to travel restrictions, the training was held online. The subsequent, **2nd Asia Regional training** in October 2021 consisted of 3 modules: Module 1 provided introductory knowledge about the e-mobility ecosystem and synergies/policy integration with other local concerns, including energy efficiency and conservation, air quality, and public health. Module 2 dived into policies and regulations to promote e-mobility, and Module 3 focused on setting up charging infrastructure, including different kinds of charging, standards and specifications, and operation models.

As a follow up, these topics were deepened in a subsequent **Kathmandu-specific training** to address local context and challenges. Workshops on **'Business models and financing for the electrification of public transport in Nepal' and 'Electrifying public transport in Nepal: Highlights on Bus conversion and light electric vehicles'** were held in Kathmandu **in November 2022** and **April 2024**. Participants included government authorities, private sectors, banks and development agencies.

Moreover, the local partner and public transport operator Sajha Yatayat organised **e-3 wheelers drivers training for women,** and an **e-bus technical training** in Kathmandu in November and December 2022.

Kathmandu stakeholders benefitted from several peer-to-peer exchanges and trainings on E-buses (organised by UITP in Kuala Lumpur, Malaysia), on electric two- and three-wheelers (organised by UNEP in Bangkok, Thailand), on e-mobility session at the Better Air Quality conference (organized by CAA in Manila, the Philippines), and on Decarbonising transport in India and the region, (organised by ITF and WI in 2024). In the context of SOLUTIONSplus, Hanoi stakeholders participated in site-visits to Hamburger Hochbahn AG (2022), EMT Madrid (2023) and Kuala Lumpur E-BRT (2023), showcasing e-buses and other e-mobility options.


Workshop on Business Model and Financing for Electrification of Public Transportation in Nepal in Nov 2022


Workshop on Electrifying public transport in Nepal: Highlights on Bus conversion and light electric vehicles in April 2024

INITIATE

To establish an ecosystem of electric mobility to enhance public transport in Kathmandu, **two local start-ups were engaged** and received seed funding. **Clean Energy International (CEI)** supported the development of prototypes for the remodeling of Safa tempos (e-3 wheelers) and converted a mini-truck into an electric vehicle. **Shree Eco visionary (SEV)** developed prototypes for **small electric wheelers with a multi-use concept** for passenger and cargo applications, and waste collection. Additionally, the local partner and public transport operator, Sajha Yatayat, converted a diesel bus to an battery electric bus – the first of its kind in Nepal. PEM motion, a German start-up selected from the EU Innovators call, provided support on the structure and design of a cargo vehicle for CEI and an e-shuttle van for SEV.

In an academic collaboration, the Kathmandu demonstration case was also a part of **Denmark Technical University (DTU)'s** B.Sc. course in June 2021 and February 2022, where students presented concepts on 'Promotion of e-mobility in the public urban transport of Kathmandu, Nepal'. Students from DTU and from King's College Kathmandu prepared two studies on the prefeasibility of vehicle integration services in June 2022. DTU M.Sc. Students also worked on the Kathmandu demonstration scaled-up assessment in 2023. A conceptual design proposal was developed as part of an M.Sc. course in Architecture and Urban Design at the Technical University of Berlin, exploring alternatives for the integration of e-mobility in the context of Kathmandu's public spaces and transport system.

IMPLEMENT

The Kathmandu demonstration initiative is a comprehensive effort aimed at establishing an electric mobility ecosystem to enhance public transport. This multifaceted project encompassed the conversion of a diesel bus into an e-bus, the remodeling of Safa tempos (e-3 wheelers) for passenger and cargo services, the design of an e-shuttle van, and exploring improvements in vehicle integration services, including the introduction of a cashless payment system.

Figure1.Converted diesel bus to electric bus

Figure 2.Remodeled Safa Tempo- passenger (left) and e-3Wheeler cargo (right), showcased in 2022

The SOLUTIONSplus project launched the vehicles in a series of releases: The remodelled Safa Tempos for passenger use and a cargo use, as well as the new e-cargo vehicle were manufactured by local companies CEI and SEV, respectively and launched during 2022, while the converted. All of these prototype vehicles are in the stage of test run, and data collection on the users' and drivers' perception and technical performance is underway as an ex-ante assessment.

Figure 3. Remodelled Safa Tempo (cargo), showcased in 2022

Figure 4. Converted mini-truck to electric, showcased in 2024

IMPACT

To assess the impact of each prototype developed in Kathmandu, a detailed **assessment is being conducted.** SOLUTIONSplus gathered 14 key stakeholders in November 2022 to advance the impact assessment of selected e-mobility demonstration actions in Kathmandu. This activity should **inform and support the scaling up** of the EV demonstrations in the city. Nepal's Department of Transport Management is drafting a policy on vehicle conversion, and Nepal Electricity Authority is developing infrastructure for a public charging system. To complement these activities, SOLUTIONSplus partners developed policy papers on vehicle conversion and charging infrastructure.

Figure 5. Workshop on Impact Assessment of Kathmandu EV demonstrations

SOLUTIONSplus also prepared a contribution on a National Urban Mobility Plan to support integrated sustainable mobility planning in Nepal.

REPLICABILITY

The project developed and tested the remodeling of ICE vehicles into battery-electric vehicles. The remodeling was conducted through local companies, using imported conversion kits. As ICE vehicles like the Safa Tempo, minibuses or light duty vehicles are abundant in Kathmandu and financial calculations suggest that the conversion are viable, the scaling up of the project is feasible in general. An optimization scenario for Lalitpur community suggested that for a for a budget of EUR € 2 million, a fleet of 25 buses, 20 waste collectors and 30 shuttle vans exhibits the best performance in meeting the stakeholder priorities. Still, the viability of conversions depends on the general state of the individual ICE vehicle basis and enabling economies of scale concerning the purchase price of the imported conversion kits.

solutions plus