Urban Pathways

E-Mobility Solutions

Electric Urban Delivery Trucks

Wuppertal Institut

UN HABITAT FOR A BETTER URBAN FUTURE

UN environment

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The Urban Pathways project helps delivering 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.

Project concept

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.

Project aims

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.

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In brief

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The electrification of urban goods delivery using appropriate electric trucks can provide significant benefits to society by meeting the requirements of urban freight tasks in a cleaner, more efficient manner. Electric trucks may also prove to be more suited to urban delivery conditions (due to higher efficiencies at lower speeds, and the provision of regenerative braking that optimizes stop-start conditions). From a total cost of ownership perspective, electric trucks may also potentially lead to lower costs due to the absence of engine and transmission related issues.

Examples Measures

Examples

Electric urban delivery trucks offer significant advantages over conventional diesel (or gasoline light trucks) trucks. Electric motors provide higher efficiencies at lower speeds that characterizes urban delivery operations. Urban delivery also requires frequent deceleration and stops, which also suit regenerative braking, as featured by many electric vehicle applications. Systematic central charging may also be suitable for urban delivery operations that ply on predictable routes.[1]

1 https://pubs-acs-org.ezproxy1.library.usyd.edu.au/doi/10.1021/es400179w

Results

The benefits to be accrued from electric delivery trucks are related to factors relevant to the conventional alternative such as fuel price, operating efficiencies under real life drive-cycles, as well as to the factors specifically influencing the electric trucks such as electricity generation and costs, transmission efficiency, recharging infrastructure, and vehicle price. A study by Lee et al. (2013) suggests that electric delivery trucks can emit 42-61% less GHGs, consume 32-54% less energy, and 22% less total cost of ownership against comparable diesel trucks. Such trucks also essentially eliminate tailpipe emissions of harmful criteria air pollutants which conventional diesel trucks are significant contributors to in urban regimes (e.g. particulates, NOx, SOx).

Technical & Financial Considerations

Cummins unveiled a battery-electric truck designed for local service, and is due for commercial production in 2019. It has a range of 100 miles, but can be extended using a "range extender" engine and generator which enables up to 300 miles. The motor is rated at 300 continuous horsepower (with peak at 470). The battery has a capacity of 140 kwh, and can be fast charged (1 hour using a dedicated plug-in station).[1] Prototype electric trucks are also being tested in South Korea, particularly smaller commercial trucks for urban delivery. The key technical considerations included in the evaluation are the following: design and optimization of vehicle, reliability under commercial operations, integration of components.[2]

Cost-effectiveness remains a key consideration for shifting towards to such vehicles. Electric trucks have higher capital costs compared to conventional diesel ones, and the difference can be up to 41% to 61%. Total cost of ownership for electric trucks can be substantially lower due to the absence of engine and transmission related issues.[3] Driving range, coupled with charging infrastructure, are also quite significant concerns. Moreover, the supporting soft infrastructure is critical for accelerating shifts towards electrification of urban goods delivery - for example, the capacity of mechanics, and repair shops to handle electric trucks must be significantly enhanced.

2 https://search-proquest-com.ezproxy1.library.usyd.edu.au/docview/1970805966?pq-origsite=summon

3 https://ac-els-cdn-com.ezproxy1.library.usyd.edu.au/S1876610217322452/1-s2.0-S1876610217322452-main.pdf?_tid=f5c07578-c248-4a48-a166-953f22d74da5&acdnat=1529753217_380f2d04caecb5f59332e539224dfba6

4 https://pubs-acs-org.ezproxy1.library.usyd.edu.au/doi/10.1021/es400179w

Policy/legislation

The existence of overall national-level electromobility roadmaps and plans would be ideal for stimulating growth in electric vehicle demand (and/or production). Specific relevant policy documents such as freight(and urban freight) specific ones should also ideally contain stipulations about incentivizing, or prioritizing electromobility.

Legal tools that would define the rules and directives for incentivizing and regulating the use of electric trucks are essential (e.g. issuance of standards for charging stations, defining geographical and temporal access to certain areas, or the provision of local parking specifications for such vehicles).

As electric vehicles in general are still costlier than conventional alternatives, financial incentives for manufacturing, or purchasing such vehicles can also be considered such as tax benefits, purchase grants, subsidies for charging, among others).

Policy/legislation

Institutions

Government institutions which are primarily responsible for overseeing urban freight would be the primary government stakeholders to be involved in such a solution. Private business involved in urban deliveries (either as direct owners of vehicles, or as delivery service providers) are also quite key as they would directly be involved in the uptake of such technologies. Compliance to national standards pertaining to vehicles, for example, should be ensured, and so government agencies responsible for trade and industry must also be involved. Similarly, environmental, and energy goals and standards must be upheld, and thus, ministries of environment, and energy must also be involved in the process. National level (or state) ministries responsible for providing finance-related incentives must also be targeted as a key stakeholder in order to facilitate the provision of incentives for the purchase (and/or research and development) of such vehicles.

Institutions

Transferability

The transferability of this solution highly depends on capitalizing on factors that maximizes the cost competitiveness of such vehicles. Cities should assess whether the characteristics of urban freight operations in their jurisdictions would be suitable for the operations of such vehicles, as well as enable the development of the necessary infrastructure (both hard and soft) for scaling up in the future. Emphasizing the non-financial aspects (benefits) of shifting towards such electric trucks would be key for enticing businesses to entertain the idea. Demonstrating the viability of such electric trucks within the local context, and properly documenting, and communicating the results would be critical.

Case Study: New York City, USA

Context

The State of New York is home to approximately 19 million people, with a total land area of 141 thousand square kilometers, and has 62 countries. It houses the New York Metropolitan Transportation Council Region which includes five boroughs within New York City as well as counties within Long Island, and the Lower Hudson Valley. At the heart of the state is New York City which is the most populous city in the United States (8.5 million people), and one of densest cities with a land area of only 789 square kilometers. Measures are being implemented at the city, and metropolitan area, and state levels in order to mitigate the pressures that are brought about by high demands for urban freight movements in the area.

In action

A public-private partnership between the state of New York and United Parcel Service (UPS) aimed at supporting the state's target of reducing GHG emissions by 40% by 2030 by converting UPS delivery trucks to electric was forged in 2017.

In November 2017, the New York State Energy Research and Development Authority (NYSERDA), together with UPS jointly announced that UPS diesel delivery vehicles will be converted to electric. The State of New York has also been implementing the New York Truck Voucher Incentive Program (VIP) which al

locates at least 19 million USD for incentivizing cleaner vehicles (9 million earmarked for electric vehicles), with a specific allocation for its "Electric Vehicle - Voucher Incentive Fund." The program is designed to provide incentives through the use of a simplified purchase voucher that can be used to reduce the csots of electric trucks at the point of sale. Up to 80% of the incremental costs of purchasing an all-electric truck (up to 150,000 USD) can be subsidized.[1]

Aside from the incentive program, the City of New York is also supporting electric trucks, such as through the provision of curbside loading zones specifically reserved for electric trucks (either exclusively, or during particular times of the day). Aside from this, the City has also committed towards transforming its own fleet, and is eyeing adding 2,000 electric vehicles to the municipal fleet by 2025.[2]
Hiring and Labor Plan
Community Outreach Plan
Privacy Policy

Results

Results

New York State and UPS's partnership will aim at developing a conversion kit, as well as a blueprint for converting up to 3 trucks per day, up to 1,500 trucks which represents 66% of UPS's fleet in New York City.[3]

The VIP program now lists 50 vehicle models (including buses) as eligible models under the scheme, as well as 13 approved vendors.[4]

5 https://truck-vip.ny.gov/about.php
6 https://www1.nyc.gov/assets/sustainability/downloads/pdf/publications/NYC%20Clean%20Fleet.pdf
7 https://truck-vip.ny.gov/about.php
8 https://truck-vip.ny.gov/NYSEV-VIF-vehicle-list.php

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