



# E-Mobility Solutions

Electric Urban Delivery Trucks



**Wuppertal  
Institut**

**UN HABITAT**  
FOR A BETTER URBAN FUTURE



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[www.uemi.net](http://www.uemi.net)

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# Future Radar project

## UEMI SOLUTIONS

## Supported by

**Urban Electric Mobility Initiative (UEMI)** was initiated by UN-Habitat and the SOLUTIONS project and launched at the UN Climate Summit in September 2014 in New York.

UEMI aims to help phasing out conventionally fueled vehicles and increase the share of electric vehicles (2-,3- and 4-wheelers) in the total volume of individual motorized transport in cities to at least 30% by 2030. The UEMI is an active partnership that aims to track international action in the area of electric mobility and initiates local actions. The UEMI delivers tools and guidelines, generates synergies between e-mobility programmes and supports local implementation actions in Africa, Asia, Europe and Latin America.

**Future Research**, Advanced Development and Implementation Activities for Road Transport (FUTURE-RADAR) project will support the European Technology Platform ERTRAC (the European Road Transport Research Advisory Council) and the European Green Vehicle Initiative PPP to create and implement the needed research and innovation strategies for a sustainable and competitive European road transport system. Linking all relevant stakeholders FUTURE-RADAR will provide the consensus-based plans and roadmaps addressing the key societal, environmental, economic and technological challenges in areas such as road transport safety, urban mobility, long distance freight transport, automated road transport, global competitiveness and all issues related to energy and environment.

FUTURE-RADAR will also facilitate exchange between cities in Europa, Asia and Latin America on urban electric mobility solutions. The FUTURE-RADAR activities include project monitoring, strategic research agendas, international assessments and recommendations for innovation deployment as well as twinning of international projects and comprehensive dissemination and awareness activities. Overall it can be stated that FUTURE-RADAR provides the best opportunity to maintain, strengthen and widen the activities to further develop the multi-stakeholder road transport research area, for the high-quality research of societal and industrial relevance in Europe.

UEMI

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In brief	5
Examples/Measures	6
Results	7
Technical/Financial Considerations	8
Policy/legislation	9
Case Study: New York City, USA	10

## Table of Content



## *In brief*

**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.

## In brief



## 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.<sup>1</sup>

## Examples Measures

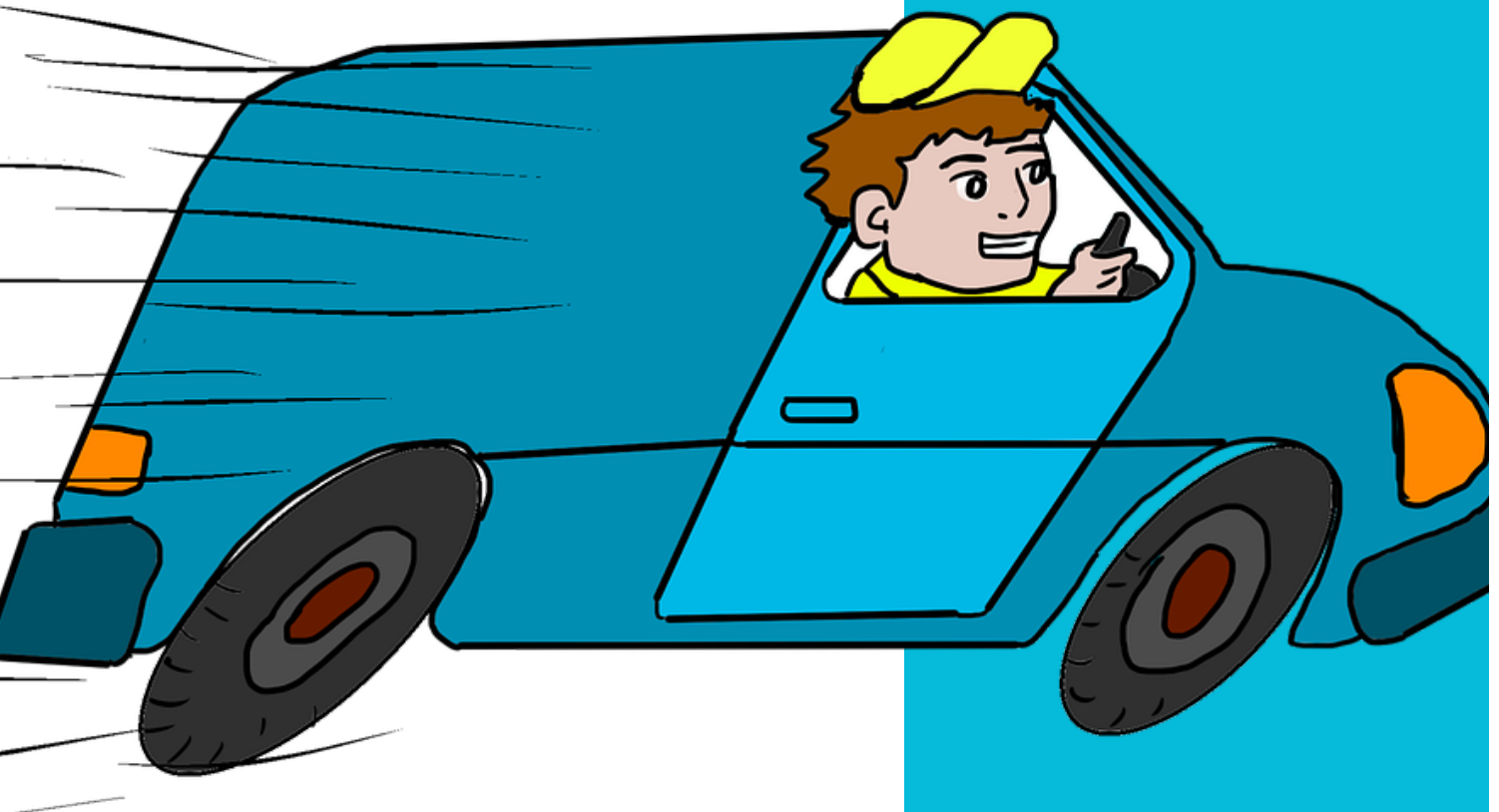


<sup>1</sup> <https://pubs-acrs-org.ezproxy1.library.usyd.edu.au/doi/10.1021/es400179w>

## 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, NO<sub>x</sub>, SO<sub>x</sub>).

## Results



## 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).<sup>1</sup> 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.<sup>2</sup>

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.<sup>3</sup> 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.

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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-a166-953f22d-74da5&acdnat=1529753217\\_380f2d04caecb-5f59332e539224dfba6](https://ac-els-cdn-com.ezproxy1.library.usyd.edu.au/S1876610217322452/1-s2.0-S1876610217322452-main.pdf?_tid=f5c07578-c248-4a48-a166-953f22d-74da5&acdnat=1529753217_380f2d04caecb-5f59332e539224dfba6)

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

# Technical & Financial Considerations



## **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).

## **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.

## Policy/legislation

## 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.

## **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-

# Transferability

## Case Study: New York City, USA

## In action

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 costs 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.<sup>1</sup>

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.<sup>2</sup>

Hiring and Labor Plan  
Community Outreach Plan  
Privacy Policy

## 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.<sup>3</sup>

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

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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>

# Results



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