Urban Electric Mobility in a 1.5°C Scenario

About this policy paper

This policy paper, prepared by the Wuppertal Institute, UC-Davis and UN-Habitat, aims to explore the pathways of urban electric mobility as part of an integrated sustainable urban mobility concept.

Electric mobility as part of a wider sustainable transport concept

Transport is a key enabler of economic activity and social connectivity. However, in 2010 the transport sector was responsible for approximately 23 % of total energy-related CO_2 emissions. Greenhouse gas (GHG) emissions from the sector have more than doubled since 1970 - increasing at a faster rate than any other energy end-use sector to reach 7 Gigatonnes (Gt) CO_2e in 2010. In a business-as-usual scenario, transport emissions could increase at a faster rate than emissions from other energy end-use sectors and reach about 12 Gt CO_2 a year by 2050 (IPCC 2014). Increasing emissions from the transport sector can endanger the goal of limiting the increase in global temperatures to 2 °C above pre-industrial levels. In addition, transport is a major contributor to outdoor air pollution, which is responsible for 3.7 million premature deaths a year, mostly in developing countries.

In response to the high and increasing GHG emissions from urban transport, and the significant potential of electric vehicles (EVs) to address this, UN-Habitat has launched the Urban Electric Mobility Initiative (UEMI), with the objective of achieving the widespread adoption of EVs in urban areas. Specifically, the initiative aims to foster EVs making up 30 % of total urban travel by 2030. Electric mobility in all forms has the potential to make an important contribution a low-carbon development pathway for transport. To ensure e-mobility solutions are properly integrated into a wider sustainable development concept, the UEMI aims to assist cities in developing and implementing packages of policies and infrastructure. The UEMI will be implemented in the overall context of better urban planning and a balanced Avoid-Shift-Improve scenario with a particular focus on access and mobility.

The UEMI together with other EV initiatives, in particular the Electric Vehicles Initiative (EVI) under the Clean Energy Ministerial, and the Zero Emission Vehicle (ZEV) Alliance led by the U.S. state of California. More specifically, contributed to call for action under the Lima-Paris Action Agenda was jointly launched at the Conference of the Parties (COP 21) in Paris in December 2016.

As part of the Paris Declaration on Electro-mobility and Climate Change a target has been set for a 20 % stock-share of passenger vehicles (cars; SUVs and other passenger light-duty vehicles (PLDVs); buses; and motorised two-wheelers) to be powered by plug-in electricity by 2030. As shown in *Figure 1*, the International Energy Agency (IEA) projects that about 2.5 billion such vehicles will be on the world's roads in 2030 (1.6 billion PLDVs; 0.8 billion two- and three-wheelers; and a few million buses). With the targeted levels of EVs much higher (as a percentage) for two- and three-wheelers (given that there are already 200 million in China), the total plug-in two- and three-wheeler stocks are about 350 million (42 %) and total PLDV stocks are about 150 million (9 %). Such a target under a scenario that focuses primarily on technology shifts within the existing mobility stricture is likely to fail to deliver wider sustainable development objectives, such as reducing congestion, and improving safety and personal activity.

Reaching the stock-targets for PLDVs may be challenging. The target of 150 million plug-in PLDVs needed by 2030 (to reach 9 % of total PLDV stock) is more than two orders of magnitude more than today's stock levels of around 1 million. Achieving this will require a rapid growth in sales from the current levels (of around 0.4 million per year) to perhaps 30 million per year in 2030.

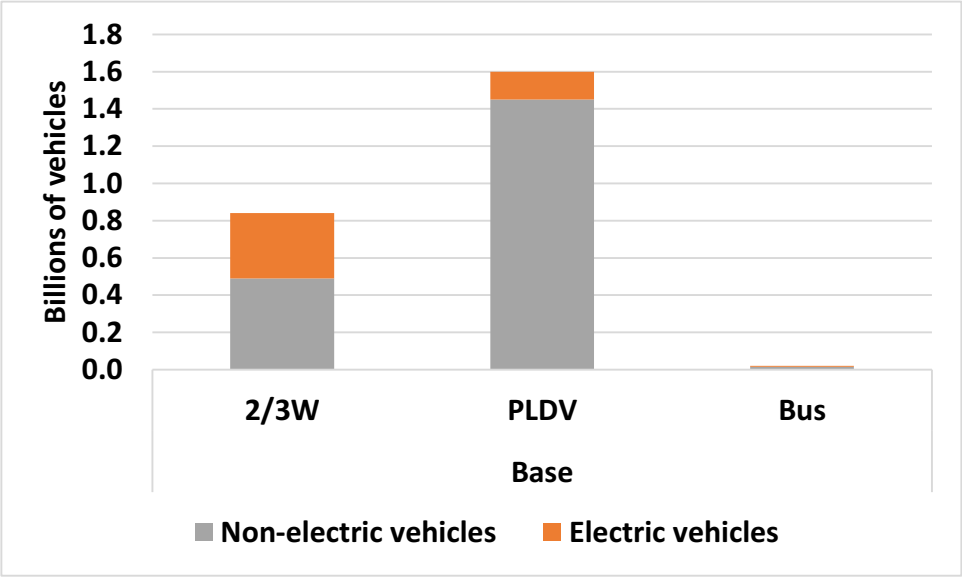

Figure 1: The IEA projections of 2030 stock of vehicles and the target percentage of e-vehicles by vehicle type

One way to reach the stated percentage stock targets and contribute to wider sustainable development goals, is to integrate e-mobility targets into a wider transition towards sustainable urban development, which is re-oriented toward mass transit and active transport modes (walking and cycling) and minimising car travel. In the recent "High Shift" scenario work by the

Institute for Transportation & Development Policy (ITDP) and the University of California, Davis (UC-Davis), car travel in urban areas around the world is cut by about 20 % in 2030 compared to a business-as-usual scenario. Motorised two-weeler travel (i.e. via internatal combustion engine motorcycles and scooters) is also cut somewhat. Re-orienting future urban development and mobility will not only substantially improve the quality of life in cities and improve transport access through a variety of modes, it will also make the electrification of individual motorised transport feasible, in particular when putting a primary focus on shared fleets (e.g. taxis, e-bikes, car-sharing and public transport). As shown in *Figure 2* and *Figure 3*, in the High Shift scenario the total stock of personal vehicles, and required stock of plug-in EVs, drops significantly. *Figure 3* shows the change just in EVs that preserves the 20 % stock target: two- and three-wheeler plug-in requirements drop from 350 to 300 million; PLDV plug-in requirements drop from 150 million to 100 million. Bus numbers rise somewhat, since there are more buses in the High Shift scenario.

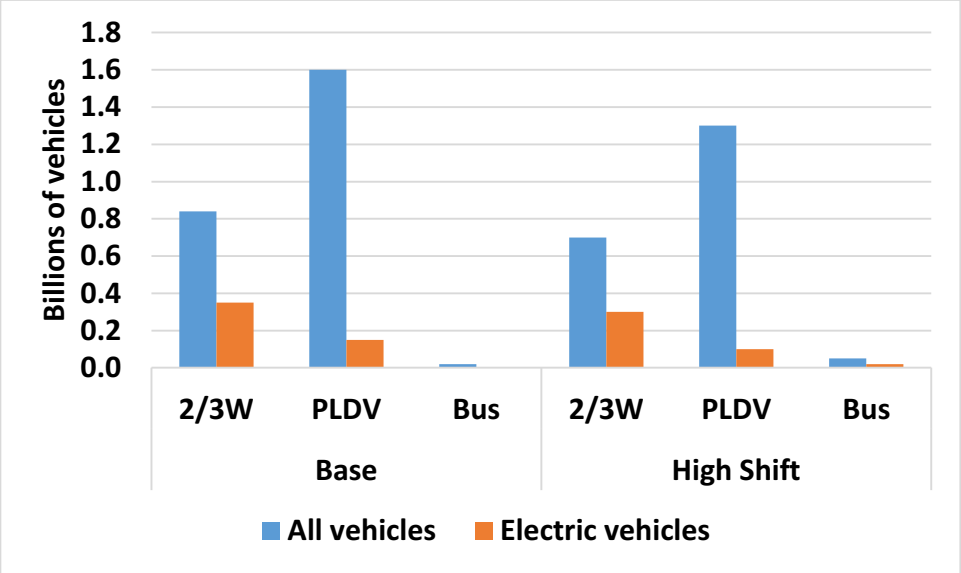

Figure 2: Base and High Shift scenario comparison of all vehicle and e-vehicle stocks in 2030

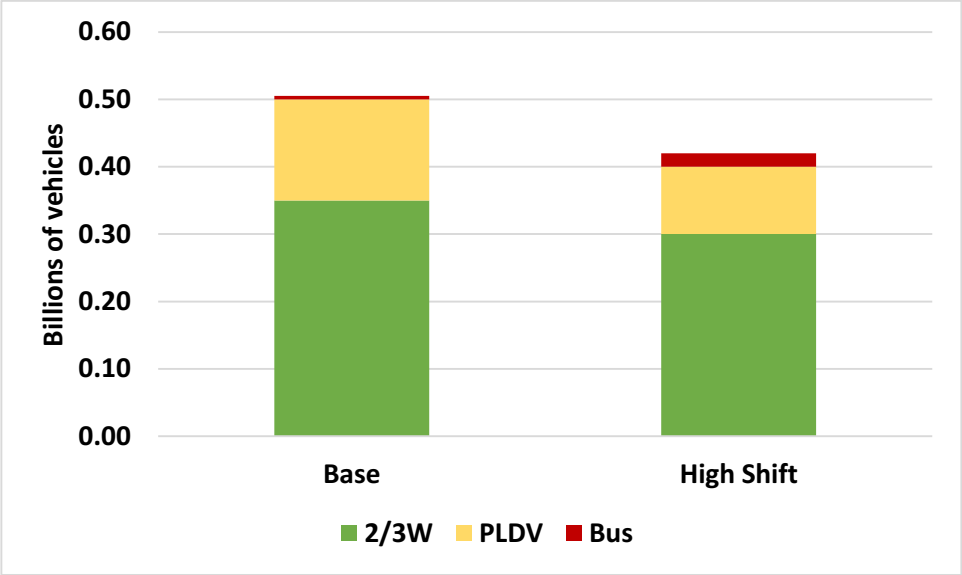

Figure 3: E-vehicle stocks in the two scenarios for 2030

Thus the High Shift scenario would provide a similar level of mobility and require a lower contribution from plug-in cars while still achieving the overall targets. And since the modal shift itself cuts CO_2 emissions significantly, it results in an overall greater level of CO_2-reduction than achieved by the electrification in the Base scenario (though this exact change in CO_2 has not been estimated). This approach aims to advance economic, social and environmental policy objectives in addition to reducing GHG emissions, which may also help generating broader political support than mitigation measures that solely focus on the reduction of GHG emissions. This approach also aims to avoid total car travel, for example, by creating more compact, multimodal communities, and providing incentives for travellers to shift from automobile to more efficient modes - in particular walking, cycling, and public transport.