



## TR 25:2022 – driving innovation in EV battery swapping

### TR 25 – adapting with the times

Since the publication of **Technical Reference for electric vehicles charging system (TR 25)** in 2010, it has played a pivotal role in shaping the landscape of electric vehicle (EV) charging in Singapore. The 2016 revision provided guidelines for tethered EV chargers, while the latest revision in 2022 expanded its scope to include on-the-go charging solutions of battery swapping to cater for the fast-paced, city-state of Singapore. This revision acknowledges the significant advancements made in the EV industry since its first publication, and sets the stage for productivity boosts allowing more organisations to adopt the use of EVs safely, backed by a standard which now covers end-to-end processes for a wide range of electric vehicles.

The Working Group (WG) appointed by the Singapore Standards Council for the latest revision comprised the LTA, various stakeholders and regional industry players such as Gogoro, who are aligning their battery swapping solutions for motorcycles<sup>1</sup> with this TR. Alignment with international standards has always been a priority for Gogoro, recognising that such efforts ensure continued interoperability, safety, and efficiency of their solutions.

In the past, the absence of a unifying standard for EVs and battery swapping impeded the widespread adoption of such solutions due to safety and interoperability concerns. Hence, Gogoro relished the opportunity to be part of the WG that developed the guidelines published in **Part 4 – Battery Swapping (for motorcycles) to TR 25:2022**. The newly-added part opens up new market opportunities for local and global providers of electric motorcycles that use battery-swapping.



Figure 1: Gogoro electric motorcycle and a battery swapping station. Image: Gogoro.

Fleets that rely on tethered charging occupy dedicated parking spaces while charging—something which land-scarce Singapore can ill-afford. In addition, downtime during tethered electric charging also results in productivity loss due to the unavailability of the vehicle for an extended period. Battery-swapping provides an alternative electric refuelling solution optimised for multiple users within a small urban footprint, enabling riders to exchange depleted batteries for fully-charged ones in a matter of seconds. Motorcycles with battery swapping capabilities are therefore ideal as fleet vehicles in densely-populated cities.

### Sandboxing new operational and business models

**TR 25:2022** complements the LTA's efforts towards the electrification of the land transport network in Singapore and the reduction of carbon emissions. In 2022, the LTA set up transport sandboxes to encourage industry innovators to try out new solutions and technologies in a safe and controlled manner.

<sup>1</sup> Motorcycle in this article refers to two- or three-wheeled vehicles with an electric motor or fuel-powered engines, and includes scooters and mopeds. It does not include motorised bicycles.

Gogoro leveraged the sandbox to test a new collaborative model with Jardine Cycle & Carriage for fleet management and Foodpanda as end-users of the EV delivery fleet. The Covid-19 pandemic introduced many new users to food delivery platforms, which rely heavily on motorcycles. This has triggered an increase<sup>2</sup> in the number of daily trips and distance covered by motorcycles. For food delivery platforms, downtime incurred by tethered electric charging also means lost earnings for the rider, as well as reduced service availability for customers. Hence, a battery-swapping enabled EV fleet makes for a highly attractive proposition.



Figure 2: Removing charged battery unit at a Gogoro battery swapping station. Image: Gogoro.

Even after establishing presence in over 50 cities around the world, Gogoro is still actively studying the complexities behind determining the optimum location and sizing for swapping stations, as well as accurately gauging the capital investment required to maximise the efficiency and profitability of the solutions they roll out. Gogoro and their partners leveraged the sandbox initiative to gather valuable operational data to shape future developments and address common issues in implementing battery-swapping infrastructure for electric motorcycles.

### Poised for market expansion

Gogoro's successful pilot in Singapore's sandbox project not only demonstrated the safety and efficacy of their battery swapping solution but also serves as a proof-of-concept to help instil confidence in prospective clients in other markets. Aligned with Singapore's reputation for stringent safety requirements, Gogoro is now well-positioned to seize new market opportunities for battery-swapping electric motorcycles in the region.

As of 2022, less than 1% of motorcycles in countries such as Indonesia, Vietnam, Cambodia and Thailand—where motorcycles are the preferred mode of transport<sup>3</sup>—were electric. The adoption of electric motorcycles in these countries is expected to soar within the next few years as the deadline for the UN's 2030 Sustainable Development Agenda approaches. To compete for market share in this fast growth area, having a reliable, financially and operationally viable system would be a key advantage.

The market demands for battery-swapping EVs can be complex, but with the release of **TR 25:2022**, clear guidance is available for both new and established industry players to provide safe and interoperable solutions. Battery swapping promises to bring efficient yet green transport solutions for not just small city-states like Singapore, but any fast-moving, densely-populated city where space is a premium.

### About Gogoro

Gogoro Inc is a global technology leader in battery-swapping ecosystems from Taiwan. Recognised and awarded by Fast Company as 'Asia-Pacific's Most Innovative Company of 2024' and by MIT Technology Review as a 2023 Climate Tech Company To Watch, Gogoro's battery swapping and vehicle platforms offer a smart, proven, and sustainable long-term ecosystem for delivering a new approach to urban mobility.

Gogoro's model includes a development kit that helps OEMs develop motorcycles that can be part of the Gogoro network. In Taiwan, their most mature market, the Gogoro network supports over 55 vehicle models across 10 different vehicle brands—a testament to the openness and interoperability of their battery swapping platform.

<sup>2</sup> <https://www.straitstimes.com/singapore/consumer/habitual-use-of-food-delivery-platforms-likely-to-last-past-pandemic-say-consumers-and-observers>

<sup>3</sup> <https://www.statista.com/statistics/1338552/sea-leading-modes-of-transportation-by-country/>