Electric vehicle charging 540 kWh

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Home charging is currently the most common means of charging electric cars. EV owners with access to a private parking space that can be equipped for charging can charge overnight, which is not only convenient but also typically takes advantage of lower electricity prices while demand is relatively low.

The availability of home charging varies substantially between regions and is linked to differences in urban, suburban and rural populations, as well as income bracket. In dense cities, where most people live in multi-unit dwellings, access to home charging is more limited and EV owners rely more heavily on public charging. This is most apparent in Korea, which is one of the world"s most densely populated countries and has the highest ratio of public charging capacity to EVs.

Although there are many more private chargers, public charging and the interoperability of its infrastructure is key to enabling more widespread adoption of and more equitable access to EVs. The public charging stock increased by more than 40% in 2023, and the growth of fast chargers - which reached 55% - outpaced that of slow chargers.4 At the end of 2023, fast chargers represented over 35% of public charging stock.

Overall, China leads electric vehicle supply equipment (EVSE) deployment, with more than 85% of the world"s fast chargers, and around 60% of slow chargers. Having achieved an electric car sales share of over 35%, thus already surpassing their policy ambition for 2025, China is shifting focus to charging infrastructure development, targeting full coverage in cities and on highways by 2030, as well as expanded rural coverage. China has also begun to support more sustainable charging behaviour, with the aim that 60% of EV charging occurs off-peak by 2025, starting with five pilot cities.

In late 2023, the European Union agreed on the text of the alternative fuels infrastructure regulation (AFIR), which will require public fast chargers every 60km along the European Union"s main transport corridors (Trans-European Transport Network [TEN-T]). This will ensure that 1.3kW of publicly accessible chargers are available for each registered BEV, and another 0.8kW for each registered PHEV.

Other developed markets are also expanding support for EVSE while reducing funding for vehicle incentives. The UnitedKingdom has ended subsidies for private cars, but maintained incentives for private and public charging installations, with more than 53600 installed as of 2023, and 300000 public chargers expected by 2030. New regulations relating to payments and reliability also aim to improve the customer experience. Elsewhere, Korea has reduced the value of its EV subsidy while committing funding to EVSE. This has attracted additional private investment to the sector, and allowed for the installation of over 200000 public chargers to date.

In other countries, EVSE targets are being adopted alongside vehicle targets. NewZealand released its charging strategy in 2023, targeting one charging hub5 every 150-200km on main highways, and at least 600

charging stations installed in rural areas by 2028. The UnitedStates announced funding for new EVSE projects, and has already installed more than 180000 public chargers towards the goal of 500000 by 2030, as well as funding the repair or replacement of existing chargers. Canada is currently on track to meet its target of 33500 charging ports by 2026. Developing markets are also increasingly recognising the importance of EVSE, such as India, which provided funding for over 7000 fast chargers in 2023.

As the number of public chargers grows, attention is also turning to the interoperability of charging infrastructure. In the United States, SAE International announced it would use Tesla"s charging connector (J3400) as the standard across North America under the North American Charging Standard (NACS). The aim is to ensure that any supplier or manufacturer is able to use and deploy the connector, providing EV drivers with more options for reliable, convenient charging across North America.

Both the AFIR regulation in Europe, and the NACS in North America, are examples of legislation enacted to enhance interoperability of the charging infrastructure. Achieving greater interoperability across more regions will require enhanced collaboration amongst all stakeholders in order to agree common standards and protocols.

Deployment of EV chargers should be co-ordinated with power grid developments to ensure that new connections are consistent with the wider grid-planning horizon. When not managed appropriately, charging can lead to a surge in peak demand, meaning that it is increasingly important to ensure that transmission and distribution grids are appropriately sized and equipped.6 Strategies to manage charging, such as through time-of-use tariffs and smart-charging, will become more necessary as EV deployment grows.

It may be more relevant to consider the total charging capacity per EV rather than EV:EVSE ratio, given that fast chargers can serve more EVs per day than slow chargers. In the initial phases of infrastructure development, the ratio of charging capacity to EV is generally high, given that charger usage will likely be low until the market matures. As the market matures and utilisation increases, the capacity per EV tends to decrease.

Connecting cities through EVSE along motorways is a priority for a number of governments. In 2023, the Australian Government announced that it will provide AUD 39.3million (Australian dollars) to the National Roads and Motorists" Association, through the Driving the Nation Fund, to build EV chargers along national highways. This proposal (like that of New Zealand) aims to install chargers every 150km along eligible routes.