

Industry Perspective

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Singapore's Roadmap to E-Mobility



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Executive Summary

January 2022

In recent years, there has been significant acceleration in global momentum towards zero emissions for road transportation. The transition to zero emission transportation as well as phasing-out of Internal Combustion Engine (ICE) cars have been on the roadmap for major economies around the world.

With this, annual electric vehicle (EV) sales have been making progress and EV sales now represent 7.2% of global new car sales in 1H21, vs. 2.6% in 2019 and 4.3% in 2020.

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For Singapore, the city aims to phase out all ICE vehicles and have entire road transportation run on cleaner energy by 2040. Under the Singapore Green Plan 2030 (SGP30), a comprehensive EV Roadmap was drawn to accelerate the adoption of EV on the roads, for both private and public sectors. Taking the lead was the public transport segment, where the Land Transport Authority (LTA) has committed to having a 100% cleaner energy fleet by 2040, purchasing only cleaner energy buses moving forward.

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This progressive transition to cleaner energy vehicles can also be seen in taxis, commercial vehicles and private car segments, on the back of accelerated new electric car registrations thus far in 2021. This momentum will surely intensify as automotive brands continue to introduce new electric models across the different vehicle segments, while the government continues its efforts in deploying charging points closer to consumers' reach.

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Singapore's EV Roadmap

Years in the works for Singapore's EV journey

The topic of green mobility in Singapore is not new; it was mooted as early as 1994

1994

Could Singapore be one of the first cities to adopt electric vehicles on our roads?

The question on whether electric vehicles (EV) can replace petrol and diesel vehicles was first explored in Parliament as early as 1994.

2009

Convening a task force

A task force involving eight government agencies was set up to assess the feasibility of EV adoption.

2011

Singapore launches EV test bed

Singapore became one of the first cities in the world to conduct test-bed for EVs

2019

Questioning the feasibility of electric vehicles

The topic with regards to the feasibility of EVs in Singapore was raised again, with discussions steered more towards charging infrastructure and its deployment in and around the city.

2020

Singapore Budget 2020: Bet on electric vehicles

In the Budget speech delivered in February, the government gave the clearest indication of its commitment to EVs, calling it the most promising cleaner vehicle technology.



Source: Dodge Data & Analytics, 2018

Singapore's EV Vision by 2040

Singapore's EV vision is accompanied by a fixed set of timeframes in order to guide policy implementation. There are three key timeframes laid out by the Land Transport Authority (LTA):

- There will be no new registration of cars running on diesel, including taxis by 2025
- By 2030, all newly registered cars and taxis to run on cleaner energy
- By 2040, all vehicles on Singapore roads will run on cleaner energy with complete phase-out of ICE vehicles

Note that other than pure electric vehicles, cleaner-energy models also include hybrid or hydrogen fuel cell cars.

Three key timeframes



2025

No more new registration of diesel cars and taxis



2030

All new cars and taxis to be cleaner-energy models



2040

All vehicles run on cleaner energy; complete phase-out of ICE vehicles

Note: Cleaner-energy models include electric, hybrid or hydrogen fuel cell cars.
Source: Land Transport Authority.

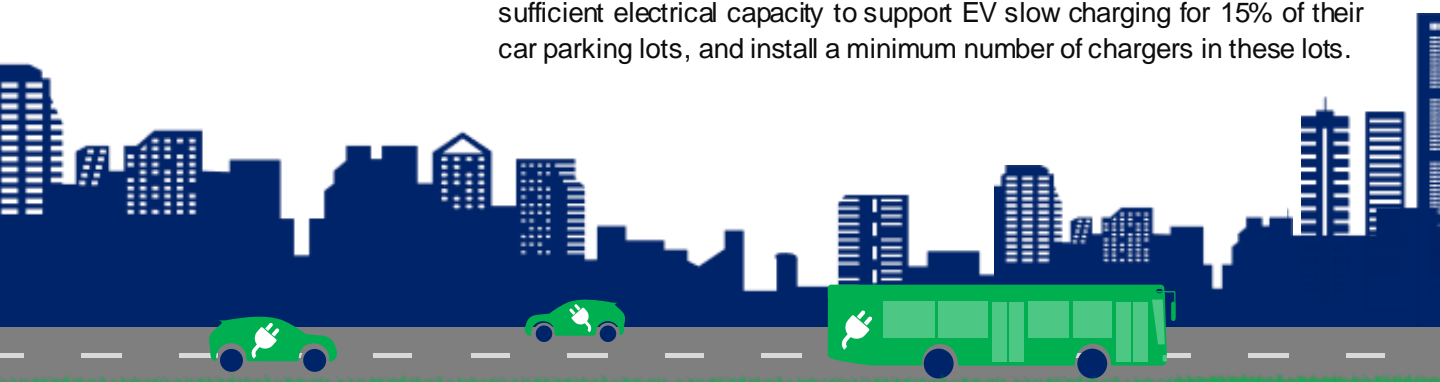
Under the Singapore Green Plan 2030 (SGP30), a combination of targets and strategies were also set out to guide the country towards its EV vision.



Availability and accessibility to charging points in both residential and non-residential areas are vital in encouraging EV adoption across the city.

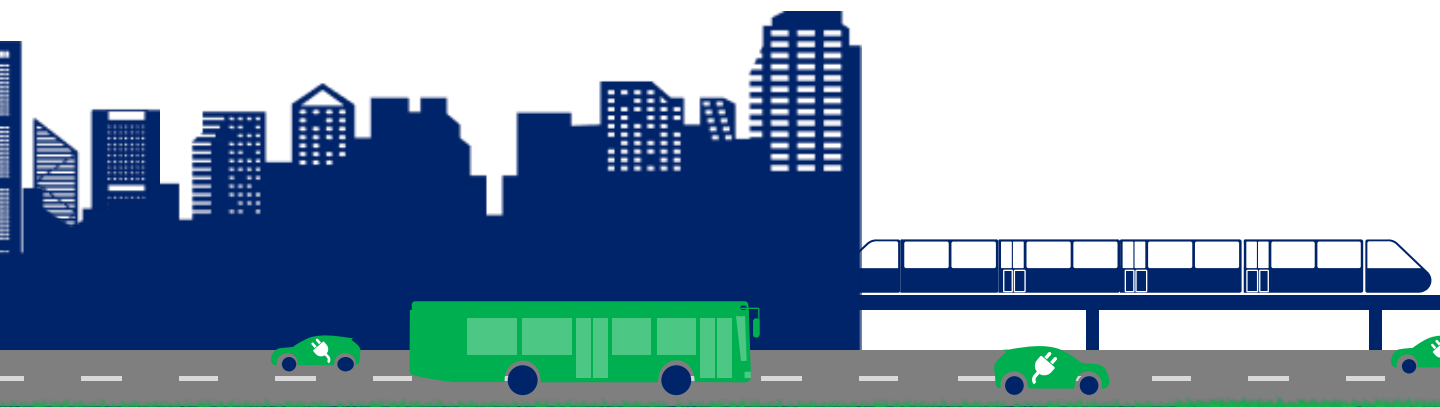
The advancement of EV technology has enabled the narrowing of cost differential between EV and ICE vehicles. By the mid-2020s, LTA expects the cost of buying an EV and an ICE vehicle to be similar. With this potential cost concern out of the way for consumers, the availability of charging infrastructure is thus the next critical factor in encouraging mass EV adoption across the city. The following is a slew of targets and strategies adopted to accelerate nation-wide deployment of charging points.

- **2030 target:** The Government targets to deploy 60,000 electric vehicle (EV) charging points across Singapore by 2030, with 40,000 in public carparks and 20,000 in private premises. As of September 2021, there are ~1,900 charging points island-wide (BlueSG, Caltex, SP Group, Shell-Greenlots). Measures are being implemented to accelerate deployment and in the near term, it is reported that charging points will be installed in a variety of public carparks island-wide where suitable and where there is spare electrical capacity. On 8 April 2021, LTA launched an industry consultation on the private sector's participation on public charger deployment.
- **Town-centric approach by HDB:** By 2025, all Housing Development Board (HDB) carparks in eight towns will be fitted with EV charging points: Ang Mo Kio, Bedok, Choa Chu Kang, Jurong West, Punggol, Queenstown, Sembawang and Tengah. LTA will also plan EV charging point deployment in other HDB towns, and strive to progressively make all towns EV-Ready by the 2030s. All new HDB carparks will cater sufficient electrical capacity to support EV slow charging for 15% of their car parking lots, and install a minimum number of chargers in these lots.



- **Pilot tender by URA and LTA:** The first pilot tender for charging points was issued by the Urban Redevelopment Authority (URA) and LTA on 30 November 2020 covering more than 600 charging points at over 200 public carparks. Tender prices are based on concession fee per kWh energy and range from 3 cents to 80 cents. The bidder will have to maintain these points for 12 years, starting as early as 31 August in 2021. In September 2021, URA and LTA announced the award of the pilot tender to 2 consortiums:
 - ComfortDelGro Engineering and its partner ENGIE South East Asia (will build 470 EV charging points in the Central, Eastern and Western regions)
 - Primech A&P with its partners Charge+, Sunseap Group and Oyika (will build 150 points in the North and North-Eastern regions)
- **EV common charger grant by LTA:** For existing non-landed private residences (NLPR), LTA will introduce the EV Common Charger Grant (ECCG) to kickstart the expansion of shared charging infrastructure in these developments. The ECCG will cover three upfront cost components of charger installation:
 - a) Charging system
 - b) Licensed electrical worker fees
 - c) Cabling and installation costs

ECCG will co-fund 50% of the above cost components with overall cap of \$4000 per charger, for up to 1% of residential parking lots in each NLPR. Co-funding will only apply to installation of chargers with smart charging functions to facilitate energy planning and more efficient electric consumption. Excluded from this grant are landed properties, shop houses, hotels, hostels, serviced apartments and workers dormitories.



Targets and regulations accelerating nationwide deployment of Electric Vehicle Charging Points

1

2030 target

60,000

Charging points to be deployed in public carparks and private premises by 2030.

2

Town-centric approach by HDB

8 HDB carparks

By 2025, all HDB carparks in eight towns will be fitted with EV charging points; will progressively make all towns EV-Ready by the 2030s.

EV charging points



3

URA and LTA's first pilot tender

NOV 2020

URA and LTA issued first pilot tender for charging points in November 2020 (closed 31 March with 19 bidders), covering >600 charging points at over 200 public carparks.

4

EV Common Charger Grant by LTA

Non-landed

For existing non-landed private residences, LTA will introduce the EV Common Charger Grant (ECCG) to kickstart the expansion of shared charging infrastructure in these developments.

Source: Land Transport Authority

Encouraging ownership of EV through incentives and rebates

With the timeframe and targets set towards the end-state vision, a set of incentives were also introduced for motorists in a bid to spur the switch to EVs.

Key summary of all incentives



EV Early Adoption Incentive (EEAI)

From 1 January 2021 to 31 December 2023, newly registered electric cars and taxis will receive a 45% rebate off the Additional Registration Fee (ARF), capped at \$20,000. To further lower the upfront cost of owning an electric car, from 1 January 2022 to 31 December 2023, the minimum payment of \$5,000 in ARF will be removed to better enable mass-market electric cars to benefit from the full rebate.



Enhanced Vehicular Emissions Scheme (VES)

From 1 January 2021 to 31 December 2022, the rebates for vehicles in both Bands A1 and A2 will be increased by \$5,000 for cars, and \$7,500 for taxis. A car in Band A1 will enjoy a \$25,000 rebate, and a car in Band A2 will enjoy a \$15,000 rebate.



Commercial Vehicles Emissions Scheme (CVES)

Commercial vehicles are categorised into three bands resulting in a \$10,000 surcharge for the most pollutive vehicles to a \$30,000 incentive for the least pollutive vehicles. This encourages buyers to choose commercial vehicle models that have lower emissions across the identified pollutant categories, effective from 1 April 2021 to 31 March 2023.



Enhanced Early Turnover Scheme (ETS)

From 1 April 2021, existing Euro 4 Cat C diesel vehicles will also be eligible for the ETS incentive. This increases the number of commercial vehicles eligible for the ETS incentive to encourage the switch to cleaner alternatives.

Source: Land Transport Authority



EEAI and Enhanced VES Scheme

Under the EV Early Adoption Incentive (EEAI), electric cars and taxis will be allocated a rebate of 45% on the ARF (Additional Registration Fee) (min. of SGD 5,000 and capped at SGD 20,000), effective from 1 January 2021. The ARF will be further lowered from \$5,000 to \$0 from 1 January 2022 to 31 December 2023.

In November 2020, LTA also announced enhancements to the Vehicular Emissions Scheme (VES) for new cars/ taxis and imported used cars with increased rebates and higher surcharges.

Figure: New VES Schedule

Band	POLLUTANTS					CARS		TAXIS	
	CO ₂ (g/km)	HC (g/km)	CO (g/km)	NO _x (g/km)	PM (mg/km)	Current rebate/ Surcharge (-/+)	Increased rebate/ Surcharge	Current rebate/ Surcharge (-/+)	Increased rebate/ Surcharge
A1	≤ 90	≤ 0.020	≤ 0.15	≤ 0.007	≤ 0.0	-20,000	-25,000*	-30,000	-37,500*
A2	≤ 125	≤ 0.036	≤ 0.19	≤ 0.013	≤ 0.3	-10,000	-15,000*	-15,000	-22,500*
B	≤ 160	≤ 0.052	≤ 0.27	≤ 0.024	≤ 0.5	0	0	0	0
C1	≤ 185	≤ 0.075	≤ 0.35	≤ 0.030	≤ 2.0	+10,000	+15,000^	+15,000	+22,500^
C2	> 185	> 0.075	> 0.35	> 0.300	> 0.20	+20,000	+25,000^	+30,000	+37,500^

*Increased rebate with effect from 1 Jan 2021; ^Increased surcharge with effect from 1 Jul 2021

Source: Land Transport Authority

Enhancing road tax incentives for EVs

The road tax structure consists of a flat component of \$700 / year, phased over 3 years and an existing variable component tiered according to power rating.

The variable component of the road tax structure for mass-market electric cars has been revised in March 2021 to ensure electric and ICE cars of similar makes and luxury levels pay similar road tax.

WEF 1 January 2022, the road tax brackets of 30-90kW and 90-230kW will be merged i.e. electric cars in the 30-230kW bracket are subjected to the road tax formula of the 30-90kW bracket. This means a reduction of up to 34% in road tax for electric cars in the 90-230kW bracket. These changes will also apply to petrol-electric cars that currently pay road tax based on their maximum electric power rating.

For existing owners of electric and petrol-electric cars who have paid road tax for the period beyond 1 January 2022 based on the existing road tax schedule, any excess road tax paid will be used to offset the amount payable at the next road tax renewal.

Figure: Road Tax Treatment

EXISTING ROAD TAX TREATMENT		NEW ROAD TAX TREATMENT	
		From 1 January 2022	
Power Rating (kW)	Current 6-monthly road tax treatment	Power Rating (kW)	New 6-monthly road tax treatment
PR ≤ 7.5	S\$200 x 0.782	PR ≤ 7.5	S\$200 x 0.782
7.5 < PR ≤ 30	[S\$200 + S\$2 (PR – 7.5)] x 0.782	7.5 < PR ≤ 30	[S\$200 + S\$2 (PR – 7.5)] x 0.782
30 < PR ≤ 90	[S\$250 + S\$3.75 (PR – 30)] x 0.782	30 < PR ≤ 230	[S\$250 + S\$3.75 (PR – 30)] x 0.782
90 < PR ≤ 230	[S\$475 + S\$7.50 (PR – 90)] x 0.782		
PR > 230	[S\$1,525 + S\$10 (PR – 230)] x 0.782	PR > 230	[S\$1,525 + S\$10 (PR – 230)] x 0.782

Source: Land Transport Authority

Commercial VES hopefully to level playing field

WEF 1 April 2021 until March 2023, Commercial Vehicle Emissions Scheme (CVES) was introduced for all new and used (not exceed 3 years of age at registration) imported Light Goods Vehicles (LGV), Goods-cum-Passenger Vehicles (GPVs), and small buses, all with maximum laden weight (MLW) not exceeding 3,500kg.

Under the CVES, LGVs are classified into Bands A, B or C according to their emissions level (from most to less pollutive) to encourage buyers to decide on a model that have lower emissions and are overall cleaner.

For vehicles in Band A (cleanest vehicles), the \$30,000 incentive will be disbursed annually in equal payments of \$10,000 to the prevailing vehicle owner over three years. Owners of Band B vehicles will receive an upfront \$10,000 incentive upon vehicle registration while owners of Band C vehicles will be imposed a \$10,000 surcharge upon vehicle registration.

Figure: New Commercial VES Schedule

Band	POLLUTANTS					NEW COMMERCIAL VEHICLE
	CO ₂ (g/km)	HC (g/km)	CO (g/km)	NO _x (g/km)	PM (mg/km)	Increased rebate/ Surcharge (+/-)
A	≤ 150	= 0.00	= 0.00	= 0.00	= 0.00	+\$30,000
B	150 < B ≤ 280	0.0 < B ≤ 0.039	0.0 < B ≤ 0.270	0.0 < B ≤ 0.008	0.0 < B ≤ 0.9	+\$10,000
C	> 280	> 0.039	> 0.270	> 0.008	> 0.9	-\$10,000

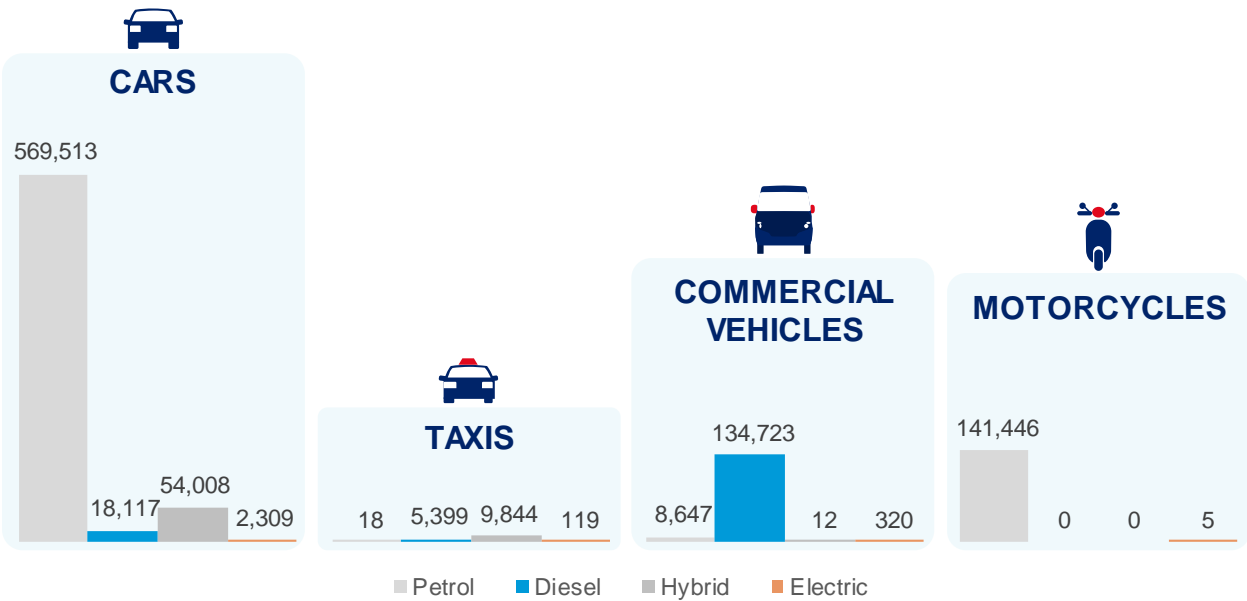
Source: Land Transport Authority, Channelnewsasia

Electrification of public transportation and commercial vehicles will have largest impact

On the Singapore roads, taxis, buses and goods vehicles are amongst the highest daily utilized fleet in operation. While the number of taxis has vastly decreased by close to half over the past five years, the number of buses (public and private) have increased marginally and now represents 2% of the existing motor vehicle population. As of 2020, only 0.5% of these 18,912 buses run on cleaner energy – the remaining runs on diesel (99.4%) and petrol (0.1%). Out of these, 5,800 units belong to the public bus fleet. This segment thus presents the highest emission reduction potential.

To reduce the carbon footprint of public transport, the segment is leading the way with LTA’s commitment to have a 100% cleaner energy bus fleet by 2040. This means that moving forward, LTA will only purchase cleaner energy buses albeit on a phased approach as it is economically unviable to convert entire fleet immediately.

Figure: Vehicle Population in Singapore as of October 2021, by type of fuels



Source: Land Transport Authority

Back in 2018, LTA purchased 60 electric buses and these have been progressively deployed since April 2020, with full deployment expected by end-2021. 20 of these buses were supplied by ST Engineering Mobility Services and will be charged using faster overhead pantograph chargers installed at Bedok and Bukit Panjang bus interchanges. The remaining 40 electric buses use conventional plug-in chargers at bus depots.

Notably, with these 60 electric buses, the CO₂ tailpipe emissions from buses will decrease by approximately 7,840 tons annually. This is equal to the annual CO₂ emissions of 1,700 passenger cars. This reflects the vast emission reduction potential in converting LTA's remaining bus fleet to cleaner energy models.

Within the private transportation segment, commercial vehicles represent a huge opportunity for electrification. This is not only because of the government's guided targets and fixed timeframes for EV policy implementation, but it is also the largest emitter of CO₂ – as at October 2021, ~143,370 units of commercial vehicles run on diesel (94%) and petrol (6%) while the remaining 0.2% runs on electric or hybrid i.e., diesel-electric.

Figure: Commercial Vehicle Population in Singapore, 2019 vs. YTD October 2021 - TABLE

	2019	2020	2020 vs. 2019, % +/-	YTD Oct 2021	2020 vs. YTD Oct 2021, % +/-
Petrol	5,109	5,816	14%	8,647	69%
Diesel	135,773	134,860	-1%	134,723	-1%
Electric	71	97	37%	320	351%
Diesel-Electric	7	7	0%	11	57%
Petrol-Electric	1	1	0%	1	0%
CNG	2	2	0%	1	-50%
Petrol-CNG	1	–	-100%	–	-100%
Total	140,964	140,783	0%	143,703	2%

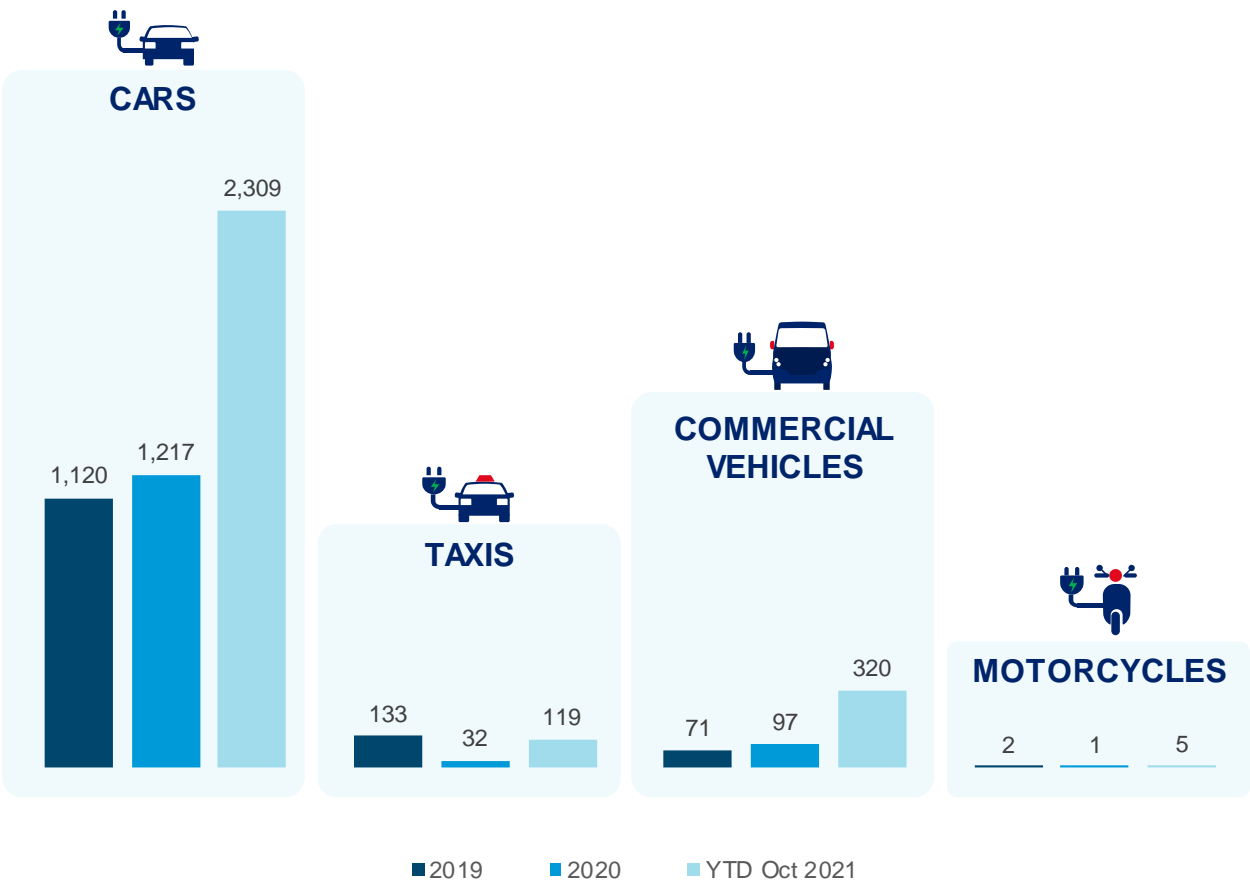
Source: Land Transport Authority

Positive take-up of EVs thus far

Acceleration in the development of the country’s nascent EV-charging infrastructure together with a slew of rebates and incentives have increased sales of EVs in 2021.

As of end-October 2021, Singapore had 2,309 electric cars on its roads, a 90% surge compared to 2020. Tesla, who started its sales portal in Singapore in February 2021, greatly contributed to new car registrations over the recent months. Notably, Tesla clocked 314 units within a single month alone in September and ended 10M21 with 543 units.

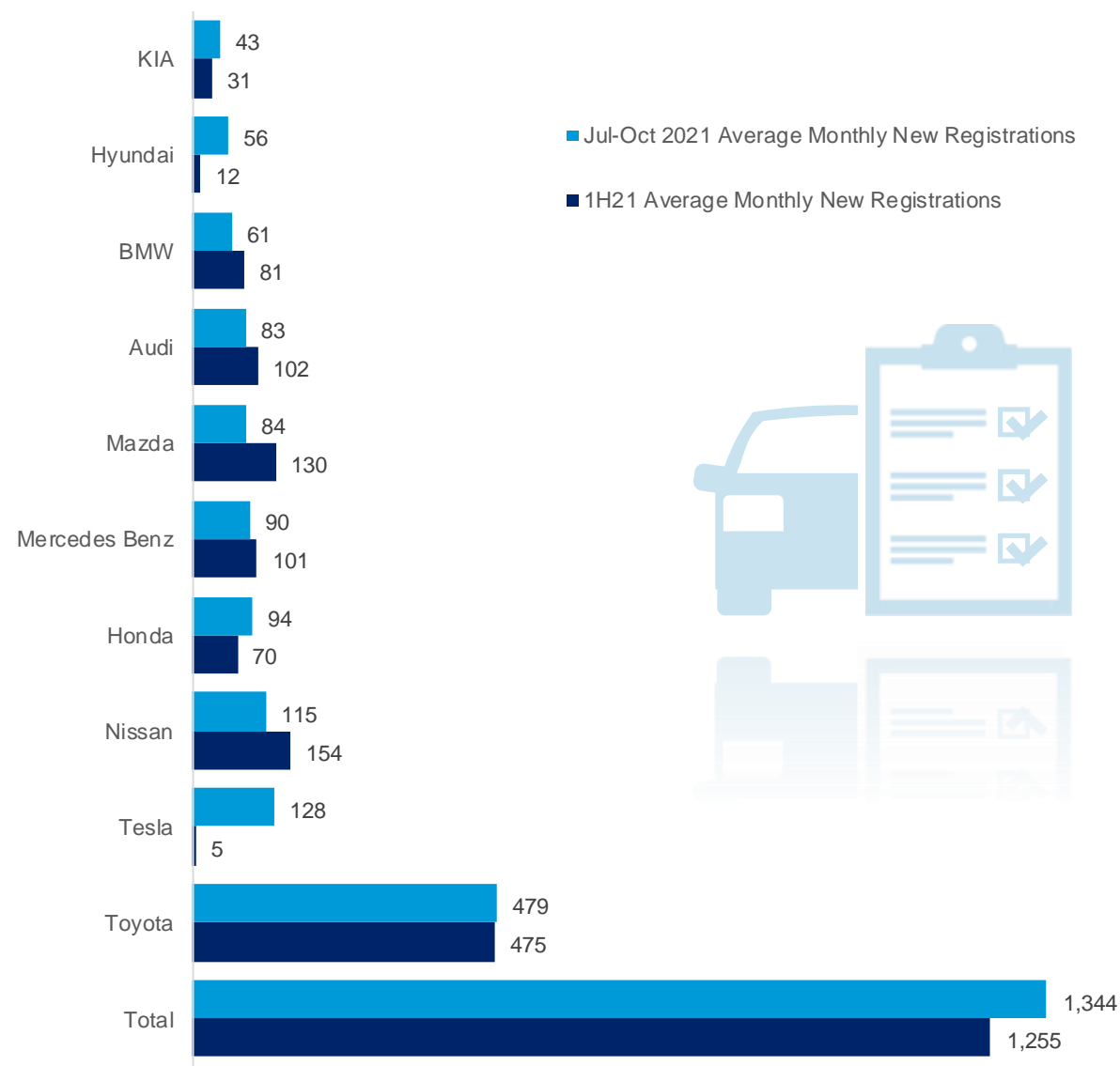
Figure: Number of Electric Vehicles on the road



Source: Land Transport Authority

The same set of encouraging figures can also be seen in the taxi and commercial vehicle segment where their electric variant expanded by more than three-folds over the same period. This momentum is expected to intensify as automotive brands continue to introduce new electric models across the different vehicle segments, while the government continues its efforts in deploying charging points closer to consumers’ reach.

Figure: Average Monthly New Registrations by Top Brands



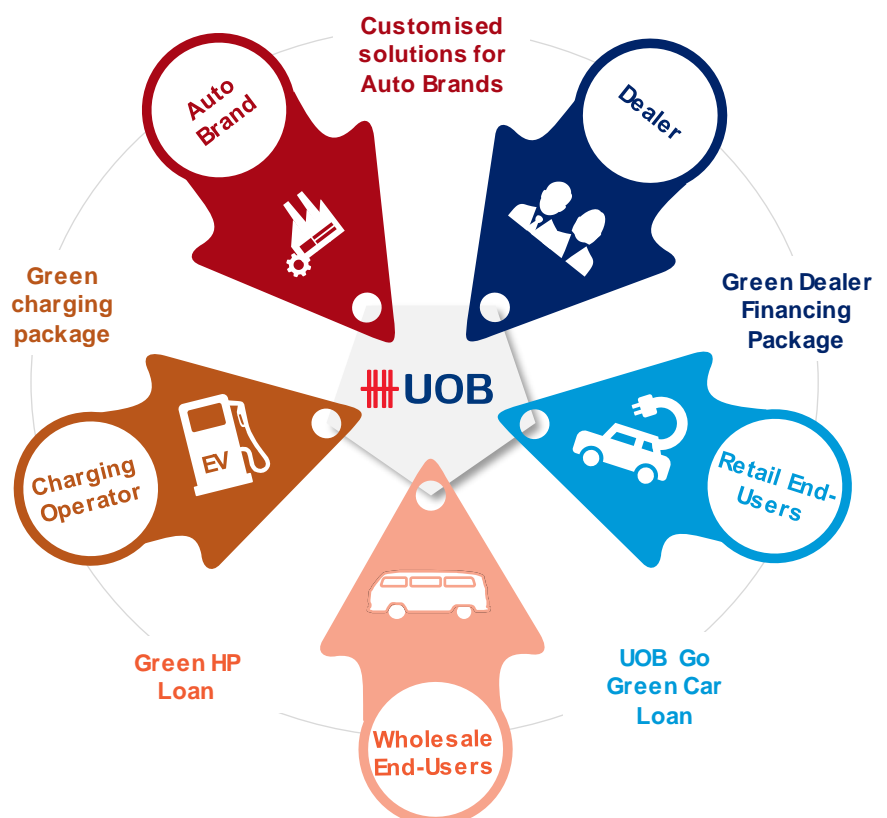
Note: Tesla began sales in Feb 2021. Source: Land Transport Authority

Comprehensive financing solution for EV ecosystem – **U-Drive**

Thus far, Singapore has made great headway in developing a holistic EV ecosystem to accelerate the switch to cleaner energy cars. To simplify this switch, UOB has launched U-Drive – a comprehensive electric vehicle financing solution for the ecosystem, catered to both businesses and individuals in Singapore. Some of the benefits include:

- Bundled facilities and flexible financing
- Low upfront investment for charging equipment financing
- Expedited approval process
- Free charging credits* upon purchase of electric vehicles from UOB's co-sponsor partners (*subject to on-going co-sponsorship promotions between UOB and partners.)

We have solutions for every need along the EV Ecosystem



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