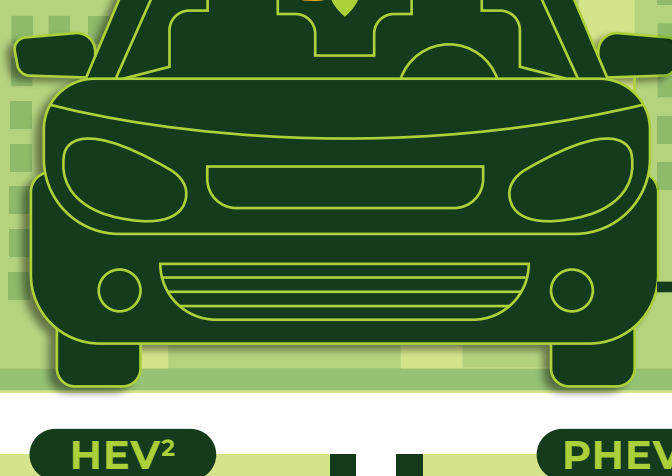


ELECTRIFIED MOBILITY IN MALAYSIA A STEP FORWARD?

What's the difference?

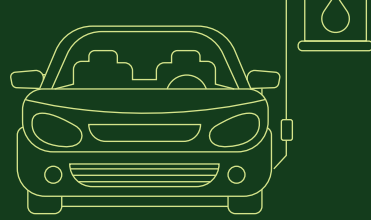
BEV¹

- battery for powering electric motor
- plug-in for charging of battery



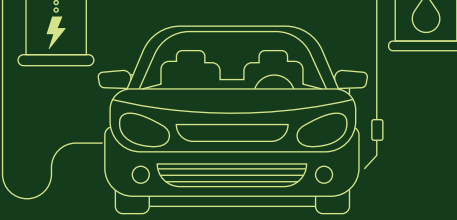
HEV²

- internal combustion engine (ICE) + electric motor powered by battery
- no plug-in for charging of battery (battery is charged through regenerative braking and by the ICE)



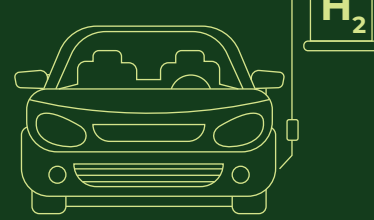
PHEV³

- ICE + electric motor powered by battery
- plug-in for charging of battery; larger battery and larger all-electric range than hybrid



FCEV⁴

- electric motor powered by hydrogen fuel cell
- fuel tank refueled at hydrogen station



The Global Transition to Electric Vehicles (EVs)

EVs are expected to replace internal combustion engine (ICE) vehicles in the next few decades:

WHAT IS SPURRING THE TRANSITION TO EVs?



Falling battery prices - it is estimated that by the late 2020s, EVs will reach price parity with ICE vehicles.⁸

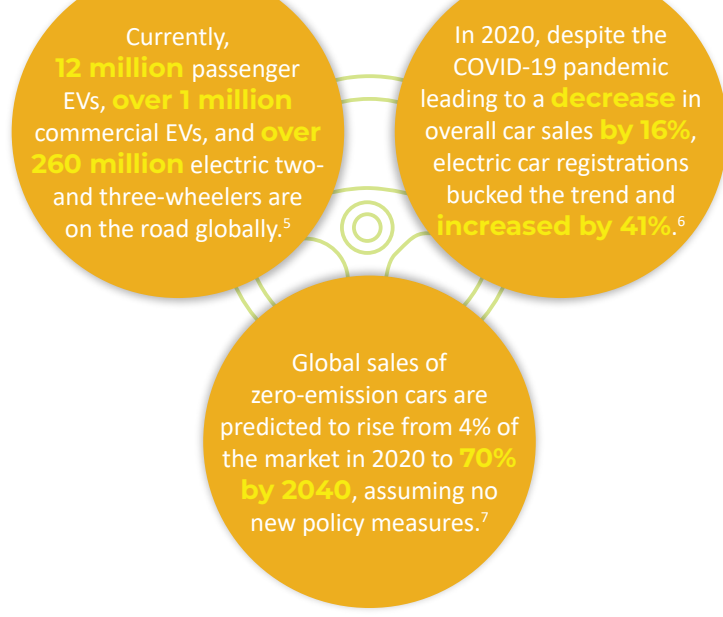


Government policies associated with climate change mitigation efforts.



Concern for the **environment**.

*Certain countries have set phase out dates for ICE vehicles (e.g., the UK has decided to ban the sale of new petrol and diesel vehicles by 2030⁹).



Transition to EVs in Malaysia?

COMMITMENTS AND TARGETS

As a signatory to the Paris Agreement, Malaysia targets to **reduce** its greenhouse gas (GHG) emissions intensity (against GDP) **by 45%** on an unconditional basis¹⁰ by 2030 relative to the 2005 level.



Malaysia adopted the **United Nations Sustainable Development Goals**, including Goal 13 (Climate Action) which calls on member states to take urgent action to combat climate change and its impacts.

EVs can play a major role in climate change mitigation efforts, particularly in Malaysia, where vehicle ownership rate is high:

IN 2016

Road transportation contributed to **21%** of Malaysia's total CO₂ emissions.¹¹

IN 2018

The number of total registered motor vehicles per 1,000 population in Malaysia was **925.1**.¹²

AS OF 31 DECEMBER 2019

There were **31.2 million** units of motor vehicles registered in Malaysia.¹³

LATEST NATIONAL POLICIES

Budget 2022

The recently approved Budget 2022 introduces tax exemptions and reliefs to support the development of the EV industry, including:

- **100% import duty and excise duty exemption** for completely built-up (CBU) EVs from 1 January 2022 to 31 December 2023;
- **100% import duty exemption on components** for locally assembled EVs from 1 January 2022 to 31 December 2025;
- **100% excise duty and sales tax exemption** for completely knocked-down (CKD) EVs from 1 January 2022 to 31 December 2025;
- **Road tax exemption** of up to 100% for EVs; and
- **Individual income tax relief** of up to RM2,500 for costs related to EV charging facilities, including installation, rental, purchase (including equipment hire-purchase) or subscription fees.

Low Carbon Mobility Blueprint (LCMB)

(*pending Cabinet approval)

In April 2021, the Ministry of Environment and Water presented the final draft of the Low Carbon Mobility Blueprint 2021-2030 (now subject to Cabinet approval) which, amongst others, aims to increase adoption of EVs in Malaysia. The key proposals include introduction of a fuel levy, compulsory emissions testing of all new vehicles, a shift to vehicle taxation system based on carbon emission (currently based on engine capacity), and a national target of 7,000 AC and 500 DC charging points.

Although the EV incentives proposed in Budget 2022 are welcome and will support the implementation of the Low Carbon Mobility Blueprint, challenges remain.

Challenges

CHALLENGES FOR EV ADOPTION

Besides the high price tag, one of the main challenges for mass EV adoption in Malaysia is the lack of charging infrastructure and the resulting 'range anxiety'. As of March 2021, there were only 326 public EV charging stations within Malaysian Green Technology and Climate Change Centre (MGTC)'s ChargeEV network,¹⁴ and most of these are concentrated within the Klang Valley and along the west coast of Peninsular Malaysia.

That being said, 'range anxiety' will lessen as the range of EVs continues to increase and with the development of charging infrastructure (particularly DC fast charging infrastructure) in Malaysia:

The average EV range is around 200 miles (approx. 320 km), but the **longest range EVs** have ranges around **400-500 miles (approx. 644-805 km)** – the 500-mile barrier was recently broken by the Lucid Air Dream Edition EVs.¹⁵

The empty to full charging time of a typical EV is around **1 hour** using **DC charging**, in comparison with around 8 hours using AC charging.

RECENT EV INFRASTRUCTURE DEVELOPMENT

The Malay Vehicle Importers and Traders Association of Malaysia (PEKEMA) and the Malaysia Automotive Robotics and IoT Institute (MARII) have formed a partnership aiming to set up **1,000 DC fast charging stations nationwide by 2025**.¹⁶

BMW is working with MGTC, Shell and Tenaga Nasional Berhad to **expand its charging network**, including installation of DC fast charging stations at key points across Malaysia, such as highway rest stops and malls.

Yinson Green Technologies has signed a term sheet with **GreenTech Malaysia Alliances**, a wholly owned subsidiary of MGTC, to form a joint venture to build upon MGTC's existing ChargeEV network.¹⁷

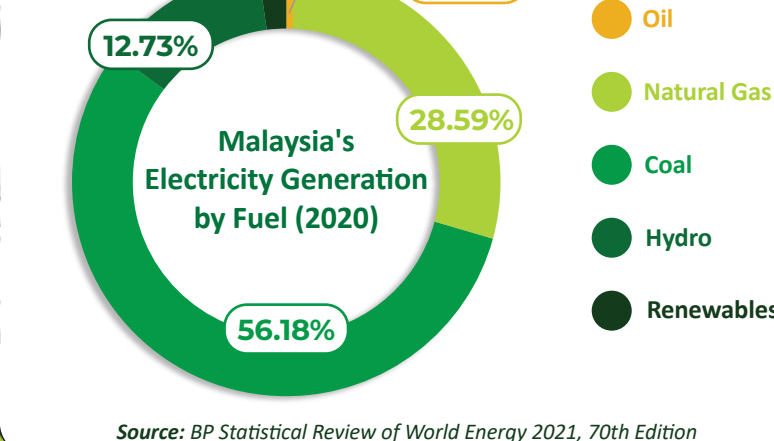
TRULY GREEN?

EVs are generally responsible for lower emissions over their lifetime than ICE vehicles. However, the lifecycle emissions of an EV are dependent on factors such as where the EV is manufactured and where the EV is driven:

The manufacturing process of EVs (particularly the battery) **produces around 30 to 40% more emissions** than ICE vehicles.

In Malaysia, electricity generation is **still heavily dependent on fossil fuels** – renewables account for only approx. 2% of the generation mix.

As such, some may argue that EVs are worse for the environment and not 'truly green'.



Source: BP Statistical Review of World Energy 2021, 70th Edition

A study published in 2020 has found that under current carbon intensities of electricity generation, electric cars are less emission intensive than fossil fuel powered cars in 95% of the world.¹⁸ An online tool developed by Transport & Environment also shows that even in the worst case scenario, an electric car with battery produced in China and driven in Poland (where coal accounts for approx. 70% of the generation mix) still emits 22% less CO₂ than diesel and 28% less than petrol.¹⁹

Nonetheless, it is evident that decarbonisation of the grid should be pursued along with increased EV adoption in order to reap the full benefits of electrified mobility in Malaysia.

Did you know?



The **first viable electric car** was built in 1884 by English inventor **Thomas Parker**, before the first gasoline car was built in 1885/1886 by Karl Benz.²⁰



The Formula E racing championship, the **Formula 1 equivalent for electric cars**, was first held in 2014 in Beijing.



EVs have **considerably fewer moving parts** than ICE vehicles and therefore require less maintenance. According to Tesla, its drivetrain has about **17 moving parts** compared with about 200 in a conventional internal combustion drivetrain.²¹

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Footnotes

- ¹ Battery Electric Vehicle
- ² Hybrid Electric Vehicle
- ³ Plug-in Hybrid Electric Vehicle
- ⁴ Fuel Cell Electric Vehicle
- ⁵ Colin McKerracher et al, 'Electric Vehicle Outlook 2021' (BloombergNEF) <https://about.bnef.com/electric-vehicle-outlook/>.
- ⁶ 'Global EV Outlook 2021' (IEA) <https://www.iea.org/reports/global-ev-outlook-2021?mode=overview>.
- ⁷ 'Electric Vehicle Sales Set to Rise Faster Than Ever, but More Policy Action Needed to Get on Track for Net Zero' (BloombergNEF, 9 June 2021)
- ⁸ Colin McKerracher et al, 'Electric Vehicle Outlook 2021' (BloombergNEF) <https://about.bnef.com/electric-vehicle-outlook/>.
- ⁹ 'Government takes historic step towards net-zero with end of sale of new petrol and diesel cars by 2030' (UK Government, 18 November 2020) <https://www.gov.uk/government/news/government-takes-historic-step-towards-net-zero-with-end-of-sale-of-new-petrol-and-diesel-cars-by-2030>.
- ¹⁰ 'Malaysia's Update of its First Nationally Determined Contribution' (UNFCCC) <https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Malaysia%20First/Malaysia%20NDC%20Updated%20Submission%20to%20UNFCCC%20July%202021%20Final.pdf>.
- ¹¹ Malaysia's Third Biennial Update Report to the UNFCCC (December 2020) <https://unfccc.int/sites/default/files/resource/MALAYSIA_BUR3-UNFCCC_Submission.pdf>.
- ¹² 'ASEAN Key Figures 2020' (ASEANstats) <https://www.aseanstats.org/publication/akf_2020/>.
- ¹³ Bernama, '31.2 million vehicles in Malaysia as of end of 2019' Astro Awani (1 April 2020) <https://www.astroawani.com/berita-malaysia/312-million-vehicles-malaysia-end-2019-236321>.
- ¹⁴ 'Key Stats as of March 2021' (ChargeEV) <https://chargeev.chargeev.my/>.
- ¹⁵ John O'Dell, 'Range Record: Lucid Air Officially Breaks The 500-Mile EV Barrier' (Forbes Wheels, 16 September 2021) <https://www.forbes.com/wheels/news/lucid-air-500-mile-range/>.
- ¹⁶ 'MARII & PEKEMA form strategic partnership to accelerate electric vehicle infrastructure development' (MARII, 16 August 2021) <https://www.marrii.my/post/marrii-pekema-form-strategic-partnership-to-accelerate-electric-vehicle-infrastructure-development>.
- ¹⁷ Shazni Ong, 'Yinson pairs up with GreenTech to accelerate development of EV charging infrastructure in Malaysia' The Edge Markets (26 October 2021) <https://www.theedgemarkets.com/article/yinson-pairs-green-tech-accelerate-development-ev-charging-infrastructure-malaysia>.
- ¹⁸ Florian Knobloch et al, 'Net emission reductions from electric cars and heat pumps in 59 world regions over time' Nature Sustainability (Vol 3, June 2020) <https://www.nature.com/articles/s41893-020-0488-7.epdf?referrer_access_token=Hmeo_HX1kf-2KzUXz051tdRgN0JAjW6l9jnR3ZoTv0OMBHrNGD6k2npei17x4aWWLctOfloyfalbH9WNy5EPZCOSWTbm4pfMxuvEuQUnMLszjDPeovKBlbvKQ2-FEFv3zieScy-tf3BHI5vbyD3JsnmeEJUbuX-CQG-8gTJdac58sREr6v>.
- ¹⁹ 'Does an electric vehicle emit less than a petrol or diesel?' (European Federation for Transport and Environment, 21 April 2020) <https://www.transportenvironment.org/discover/does-electric-vehicle-emit-less-petrol-or-diesel/>.
- ²⁰ Peter Valdes-Dapena and Ivory Sherman, 'Electric cars have been around since before the US Civil War' CNN (18 July 2019) <https://edition.cnn.com/interactive/2019/07/business/electric-car-timeline/index.html>.
- ²¹ Madhur Boloor, Patricia Valderama, Ada Statler and Samuel Garcia, 'Electric Vehicles 101' (Natural Resources Defense Council, 31 July 2019) <https://www.nrdc.org/experts/madhur-boloor/electric-vehicles-101>.

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