AUGUST, 2024

SUMMARY REPORT

DEVELOP A NATIONAL PROGRAMME FOR TRANSITION TO ELECTRIC TRANSPORT VEHICLES

NDC TRANSPORT INITIATIVE FOR ASIA

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Supported by:

Federal Ministry for Economic Affairs and Climate Action

on the basis of a decision by the German Bundestag

IKI INTERNATIONAL CLIMATE INITIATIVE

ADRVN

Summary

Currently, road transport operations depend largely on fossil fuel sources, with about 99.7% of total energy demand coming from diesel and gasoline. According to the 2021 energy balance table, the total final energy consumption demand of the transport sector accounts for about 16.5% of the total national energy consumption demand. Among them, the road sub-sector is the largest energy consumer, accounting for over 85% of the total energy demand of the entire industry (VNEEP, 2021). In that context, transport is one of the main sectors causing greenhouse gas (GHG) emissions and air pollution in Viet Nam. GHG emissions from transport activities account for about 18% of the country's total GHG emissions and are still on an annual increasing trend. Among them, roads have the largest proportion of GHG emissions, accounting for about 80% of the total GHG emissions of the entire industry (WB, GIZ, 2019).

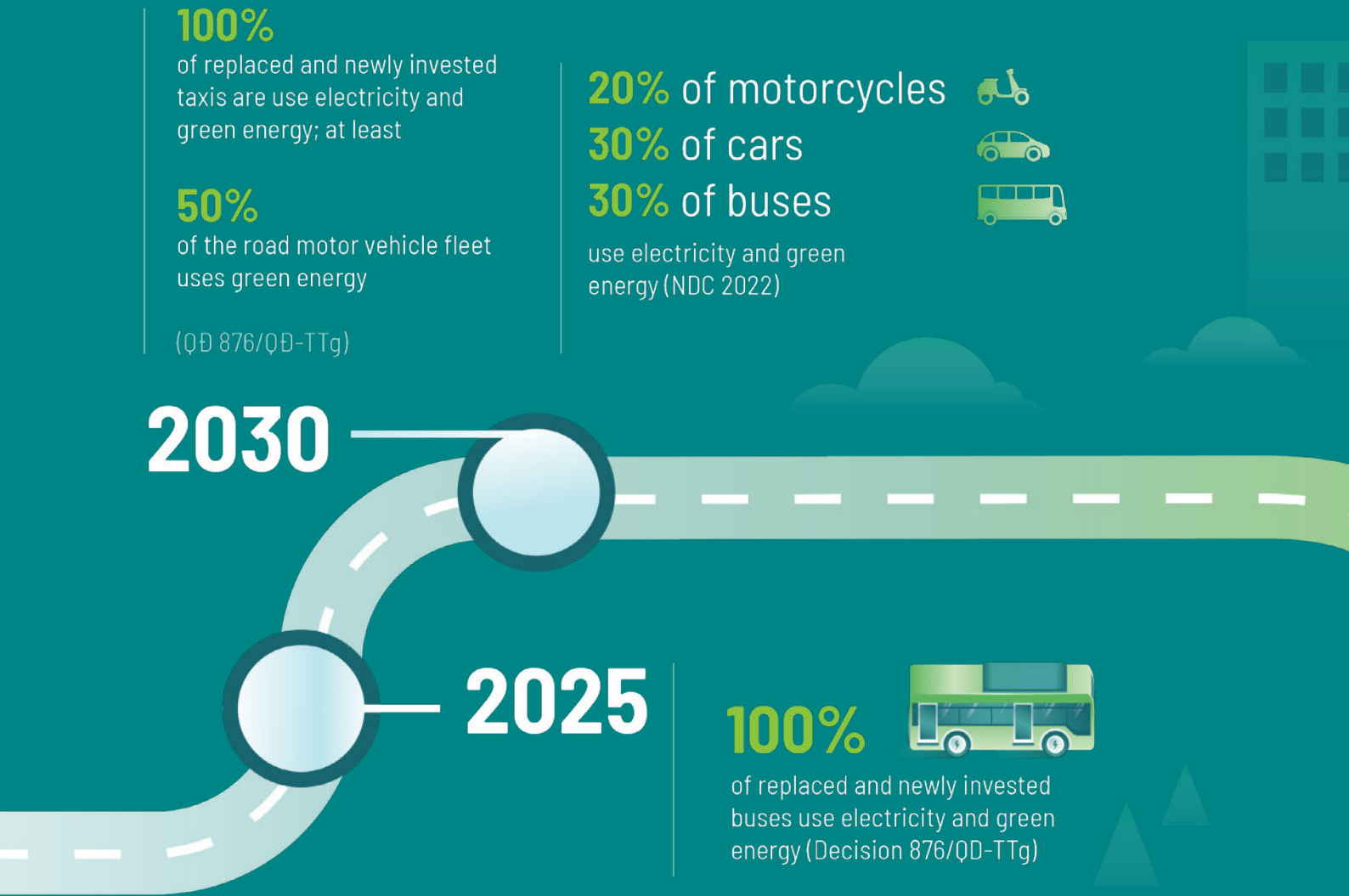
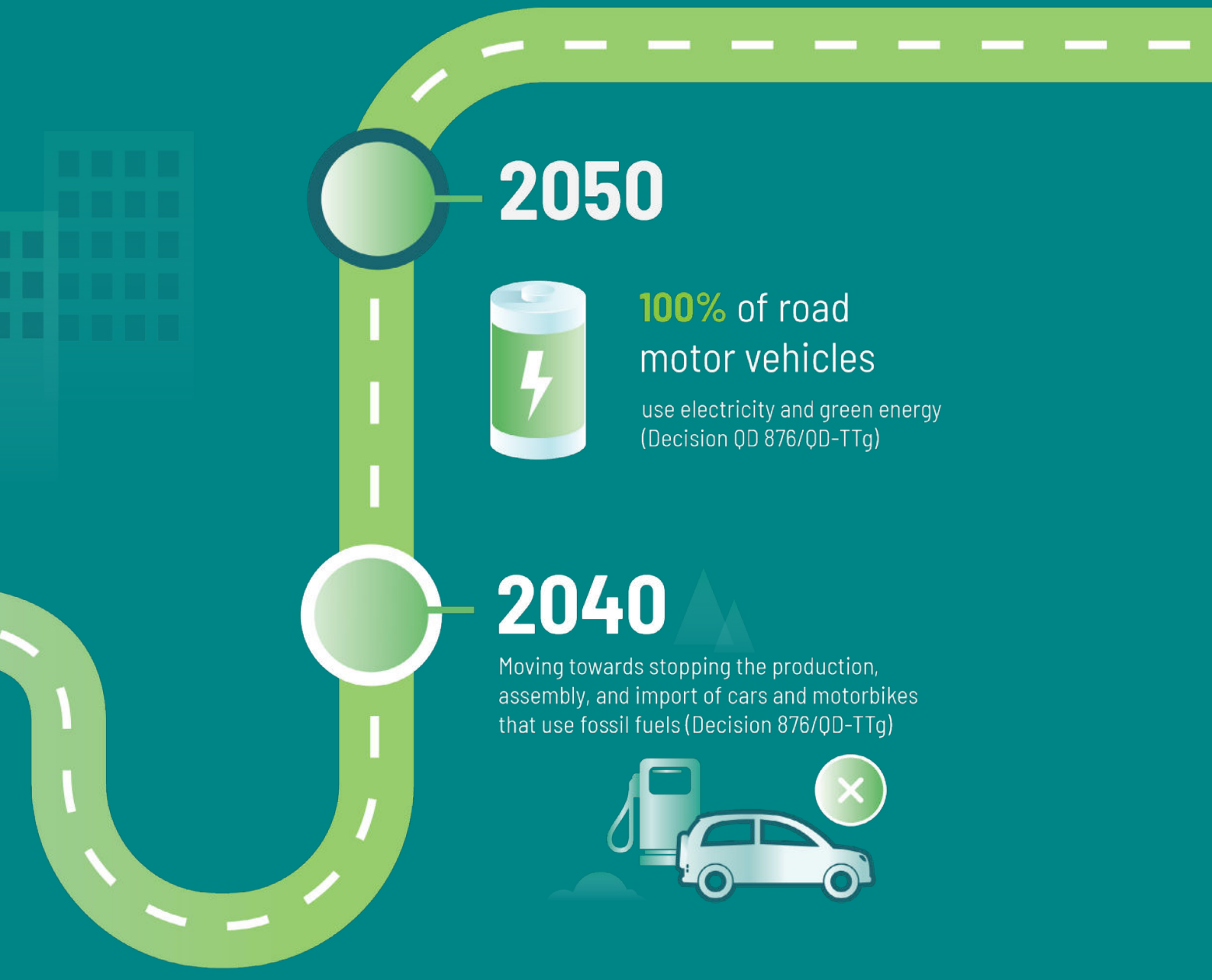


Figure 1: Setting specific targets related to electric vehicles in the road sub-sector in Viet Nam (Nguồn: Tổng hợp)

Developing electric vehicles has been identified as one of the key solutions to sharply reduce GHG emissions in the road transport sector in Viet Nam.

Since committing to achieving net zero emissions (NET) by 2050, Viet Nam has soon updated the content of its Nationally Determined Contribution (NDC) report to submit to the United Nations Framework Convention on Climate Change by 2022, referred to as NDC 2022. In the NDC 2022, shifting road vehicles to use electricity and green energy is one of the six main groups of solutions to cut GHG emissions in the transport sector. To concretise the commitment, Viet Nam soon issued a roadmap for the green energy transition in the transport sector in Decision 876/QD-TTg issued in 2022. Specific goals for the electric vehicle (EV) fleet in the road sub-sector are summarized below:



(a) Goals for road transport in general

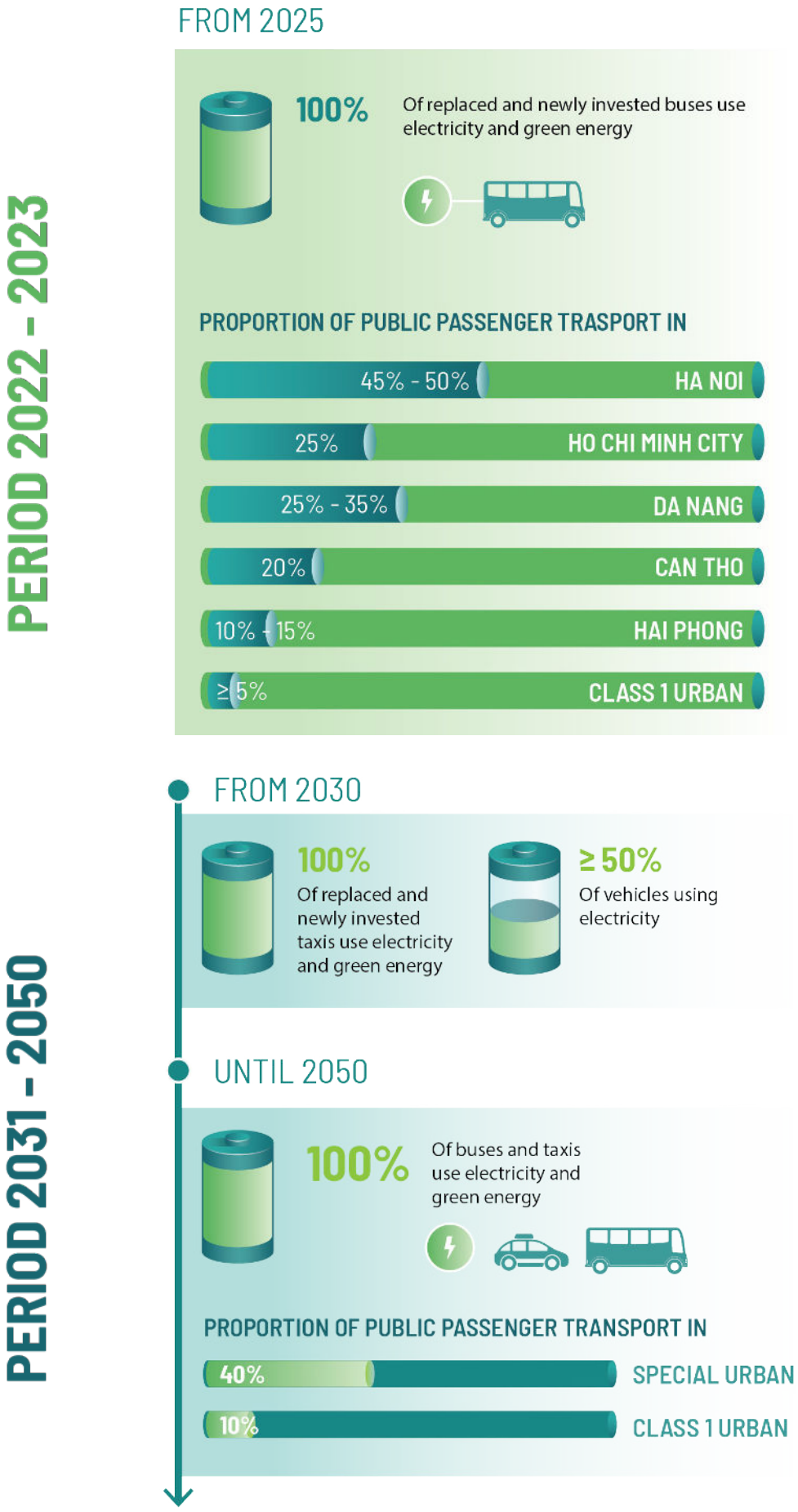


Figure 1: Setting specific targets related to electric vehicles in the road sub-sector in Viet Nam

(b) Targets for road transport in large cities

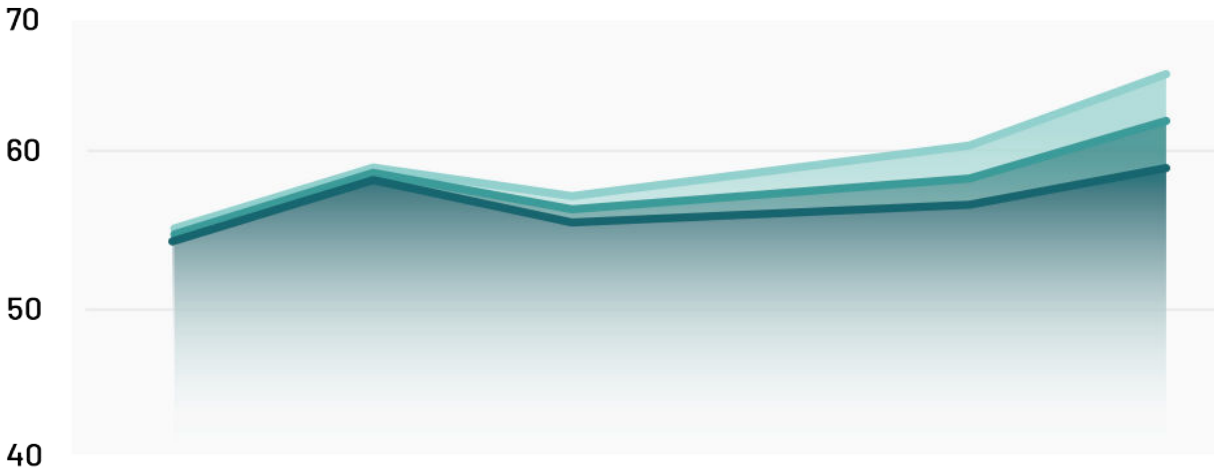
Roads will still play a key role in transporting passengers and goods in the period 2025 - 2050 according to the Business-as-usual Development Scenario.

According to the Business-As-Usual Development Scenario (BAU Scenario), roads are forecast to account for about 88.1% of passenger traffic demand by 2050, achieving an average growth rate of 3.1% per year, and taking on about 42.6% of good circulation demand, achieving an average growth rate of 5.5% per year.

The size of the road motor vehicle fleet tends to grow positively in the period 2025 - 2050.

In all three scenarios, the size of the road motor vehicle fleet is forecast to have a positive growth trend, with an average annual growth rate in the period 2025 - 2050 for the BAU Scenario, the Domestic Resource (DOM) Scenario, and the net zero emissions (NET) Scenario are 0.9% per year, 0.7% per year and 0.4% per year, respectively (Figure E.2). By 2050, the total number of road motor vehicles in circulation is forecast to reach about 66.32 million vehicles under the BAU Scenario, 62.08 million vehicles under the DOM Scenario, and 57.58 million vehicles under the NET Scenario.

Number of RMVs in circulation (million vehicles)



	2025	2030	2035	2040	2045	2050
BAU Scenario	52.98	57.81	55.42	57.61	60.54	66.32
DOM Scenario	52.80	57.50	54.62	56.24	58.14	62.08
NET Scenario	52.56	57.07	53.79	54.79	55.61	57.58

Figure 2 : Forecasting the size of the road motor vehicle fleet in the period 2025 - 2050 under the proposed scenarios

With current policies and technology development trends, EVs will account for a large proportion of the road vehicle fleet structure in the future.

The BAU scenario only has the penetration of electric motorcycles (battery electric vehicles - BEVs) with a very small proportion which is from 4% to 6%. For the DOM Scenario and the NET Scenario, the penetration of EVs is expanded to all types of road motor vehicles. Depending on the maturity of technology and the market development trends, the time of penetration and the penetration density of different types of vehicles are assumed to be different; among them.

BEVs will still dominate with over

98% MARKET **share during the period 2025 - 2050 in both scenarios.**

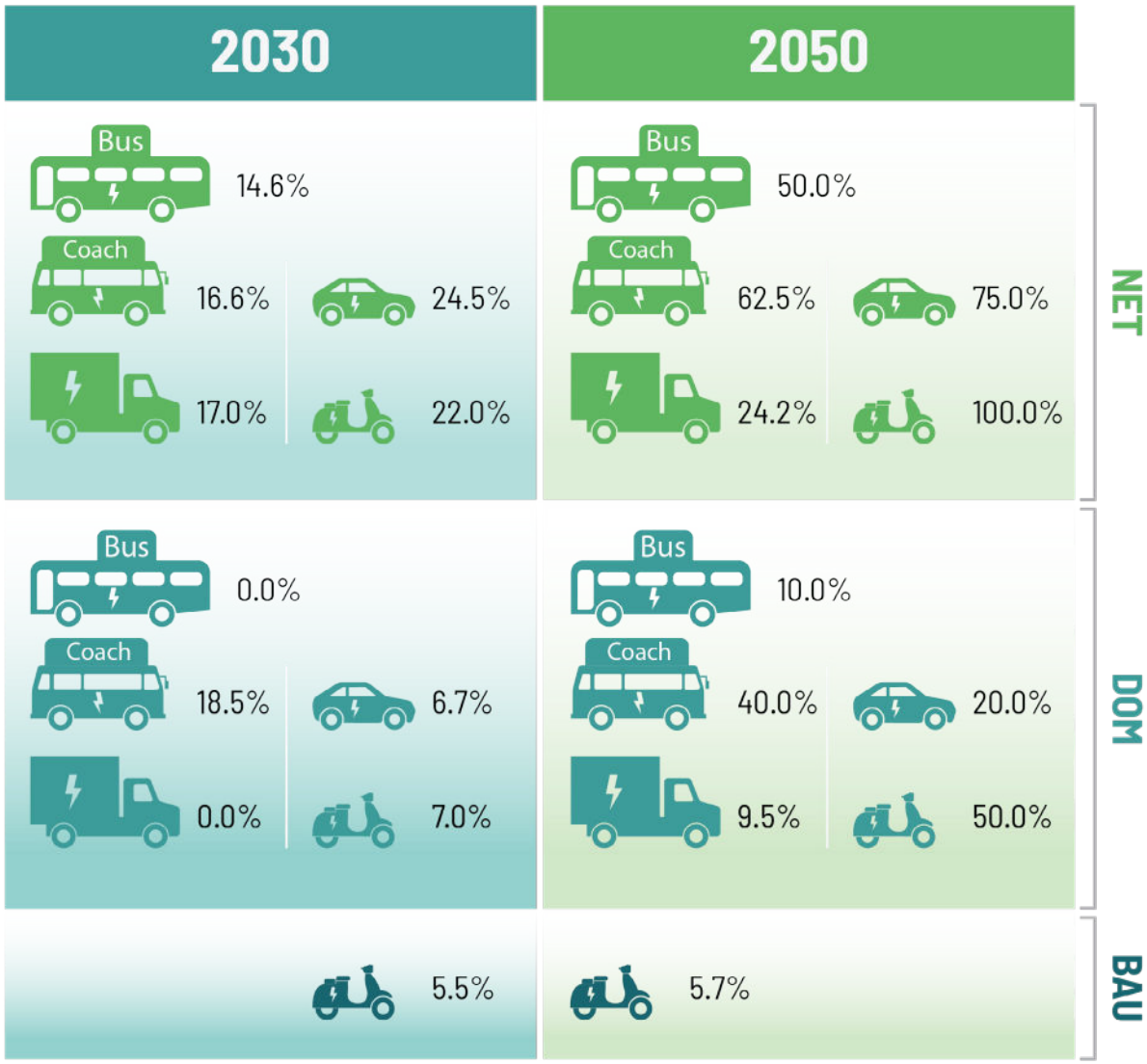


Figure 3 : Electric vehicle penetration under different scenarios

The number of EVs in the road sub-sector accounts for the largest proportion of the fleet of vehicles using green energy in the period 2025 - 2050 under the emission reduction scenarios.

With the dual goal of minimising system costs and ensuring set emission reduction targets, road EVs are forecast to have stronger penetration than other green or clean energy types such as CNG, Methanol and Hydrogen (Figure 4).

Motorcycles can aim to achieve 100% market share of electric motorcycles in both scenarios

For buses, two forms of green energy, CNG and electricity, will be allocated in the period up to 2035 in both scenarios. By 2050, the proportion of EVs in the bus fleet will be 80% and 62.5% in the DOM Scenario and the NET Scenario, respectively. The rest are buses that use Methanol and Hydrogen

In the NET Scenario, passenger cars using electricity will account for about 75% by 2050.

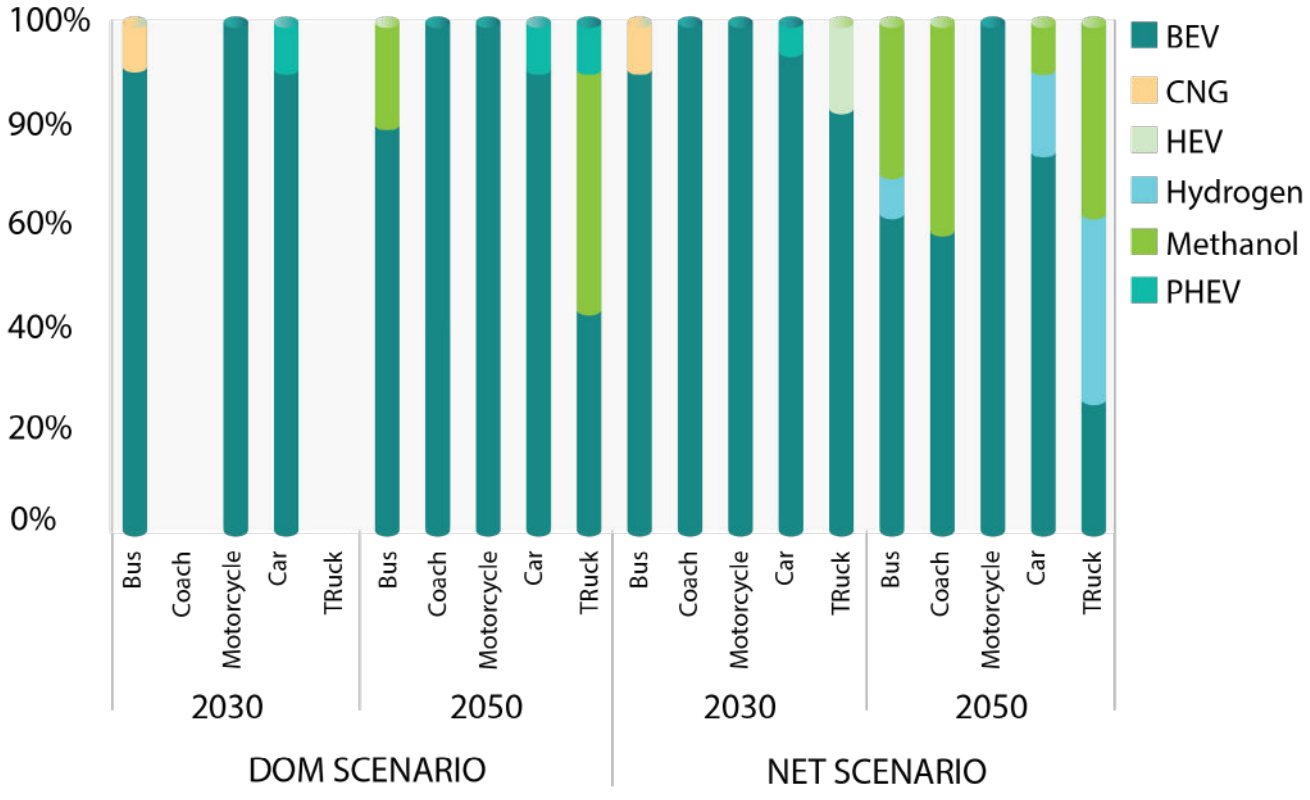


Figure 4 : Proportion of electric vehicles in the fleet of road motor vehicles using green energy under different scenarios

In the period 2030-2050, electric cars will play the leading role among road transport developments in the road sub-sector while electric motorbikes will rank second.

Under the DOM Scenario, the proportion of passenger transport by electric cars ranges from 34.5% to 40.7%. The proportion of passenger transport by electric motorcycles ranges from 33.6% to 53.1%. Under the NET Scenario, the proportion of passenger movements by electric cars ranges from 35.8% to 46.4%; The proportion of passenger circulation by electric motorcycles ranges from 22.4% to 43.6%. In the NET Scenario, electric cars tend to expand their market share whereas motorcyles tend to narrow their market share.

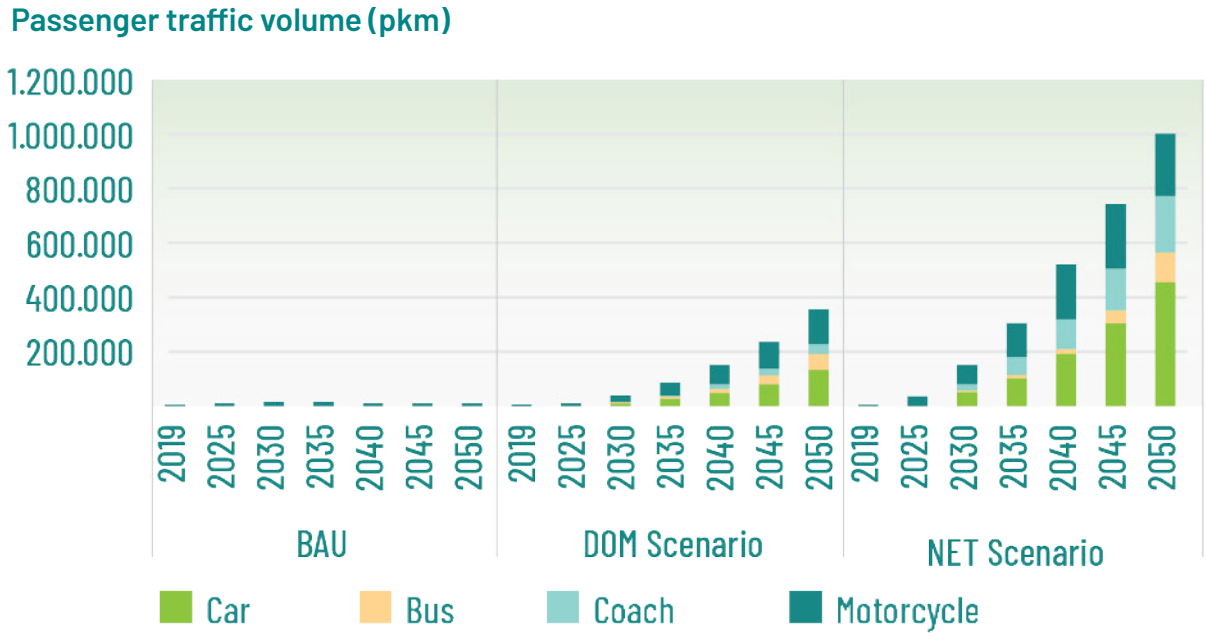


Figure 5: Compare passenger traffic according to types of road EVs and scenarios

The penetration of electricity in trucks is slower than other types of road transport vehicles and are implemented first for light trucks under the emission mitigation scenarios. Under the DOM Scenario, electricity penetrates the truck fleet from 2035 with a very small share of traffic; there is no penetration of electricity on medium and heavy trucks. Under the NET Scenario, electricity penetrates the truck fleet from 2025 regarding light trucks, with the freight volume handled by electric trucks reaching about 1,370 million tkm. From 2030, electricity begins to penetrate medium trucks, so the amount of freight transported by electric trucks under the NET Scenario is forecast to increase significantly, reaching an average growth rate of about 16% per year. By 2050, the volume of freight transported by trucks could reach 15,040 million tkm under the DOM Scenario and 54,970 million tkm under the NET Scenario. It is noted that electric trucks will not be deployed under the BAU Scenario even if they are light trucks.

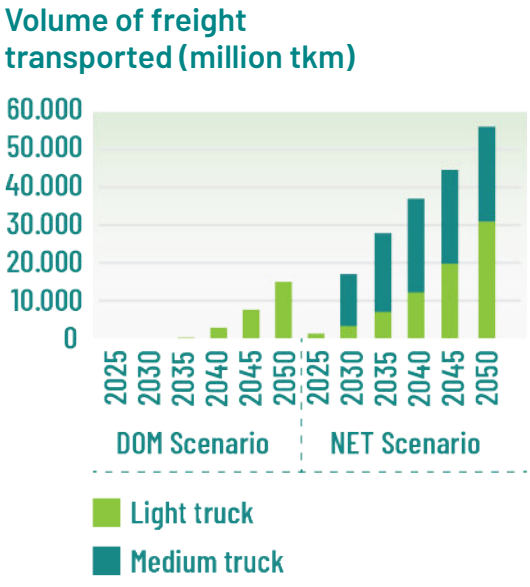


Figure 6: Compare the freight volume transported by electric trucks

New electric vehicle sales are forecast to increase gradually throughout the period 2025 - 2050, with electric motorcycle sales being the largest.

Under the NET Scenario, new electric motorcycle sales and electric motorbike sales will be about

2,030 thousand vehicles/ year by 2050

Meanwhile, the sales of electric buses only reach about

13.2 thousand vehicles/year

the lowest among all electric vehicles sold.

The average annual growth rate of electric vehicle sales for:

Cars is the highest
36,4%/year

Buses
33,3%/year

Trucks
9,1%/year

Passenger cars
4,6%/year

Motorcycles
4,1%/year

Total electric vehicle sales in 2050 will reach about 4.75 million vehicles/year, about 1.9 times higher than the DOM Scenario.

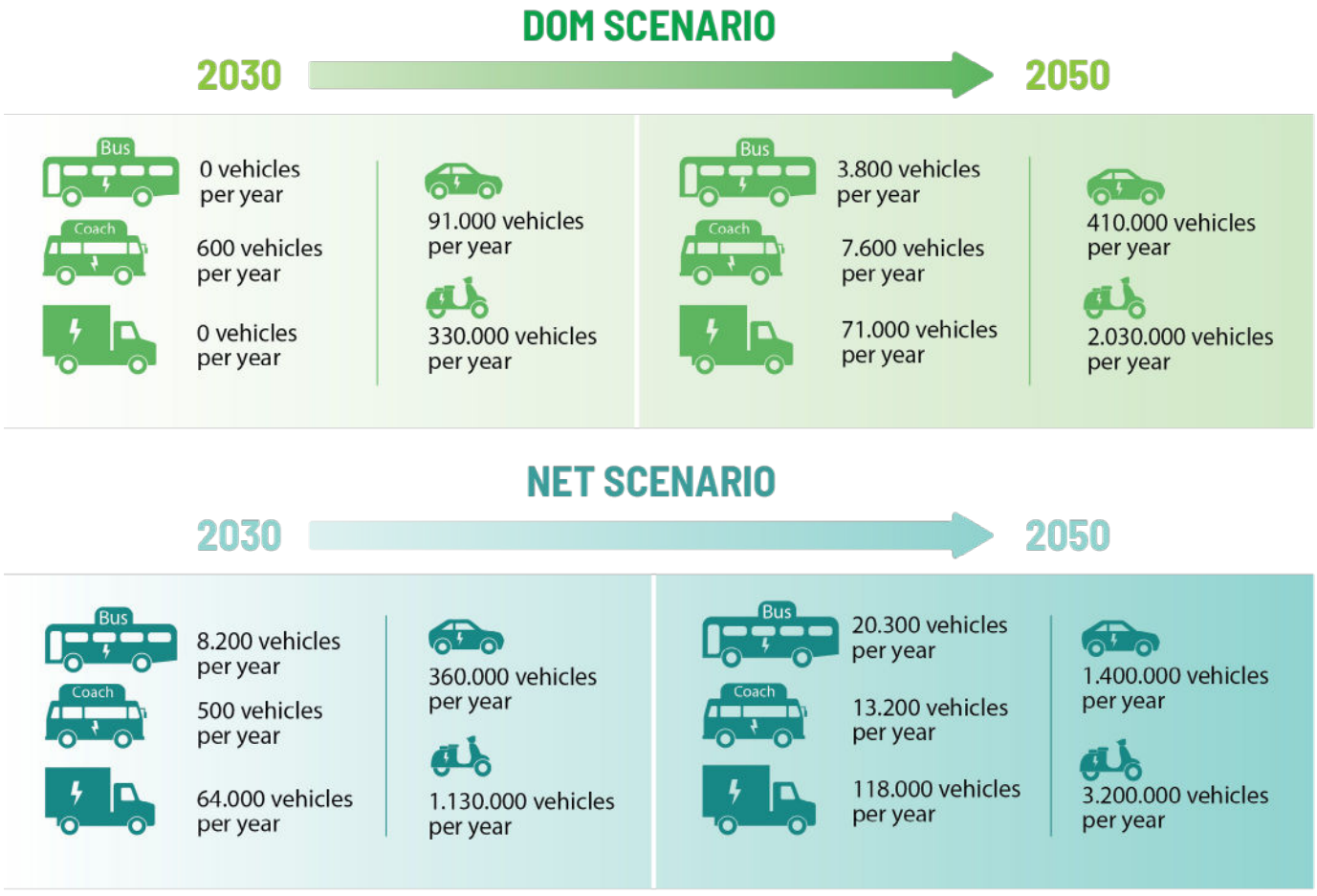


Figure 7: New electric vehicle sales by vehicle type and emission reduction scenarios

To meet the electricity demand corresponding to the size of the EV fleet under the emission mitigation scenarios, Viet Nam needs to promote the development of public charging station infrastructure.

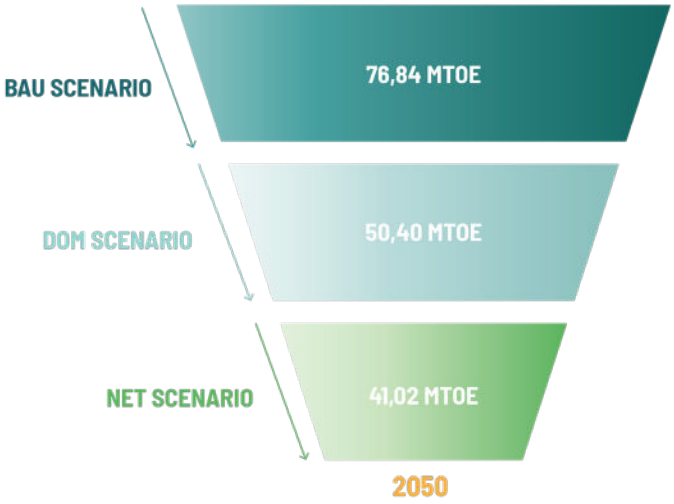
The number of public charging stations should be installed to ensure a 10:1 ratio of electric vehicles to charging stations as recommended by the International Energy Agency (IEA).

		2030	2040	2050
DOM SCENARIO	Public charging stations	29.360	136.440	366.470
	Charging stations for bus	880	3.530	12.370
NET SCENARIO	Public charging stations	201,440	657.180	1.536.800
	Charging stations for bus	930	4.700	25.750

Figure 8: Number of public charging stations according to scenarios

The electric vehicle development programme contributes to increasing energy efficiency in the road sub-sector.

The average annual growth rate of energy demand in the road sub-sector in the period 2025 - 2050 under the BAU Scenario, DOM Scenario, and NET Scenario is forecast to reach 4.8%/year, 3.2%/year, and 2.9%/year, respectively. Transport modal shift and energy efficiency solutions integrated into the DOM Scenario and NET Scenario with different intervention levels have led to reduced energy demand in the road sub-sector compared to the BAU Scenario (Figure 9).



(Note: fuel is converted to million tons of oil equivalent, MTOE)

Figure 9: Compare energy demand in the road sub-sector under different scenarios

The demand for electrical energy used in the road sub-sector grows strongly in the emission mitigation scenarios.

In the period 2025 - 2050, the average annual growth rate of electricity demand for the road sub-sector in the DOM Scenario is 17.1% and in the NET Scenario is 16.9%/year. By 2050, the electrical energy demand in the DOM Scenario and the NET Scenario will reach 31.32 GWh and 90.57 GWh respectively, increasing about 63.1 and 182.6 times compared to the BAU Scenario.

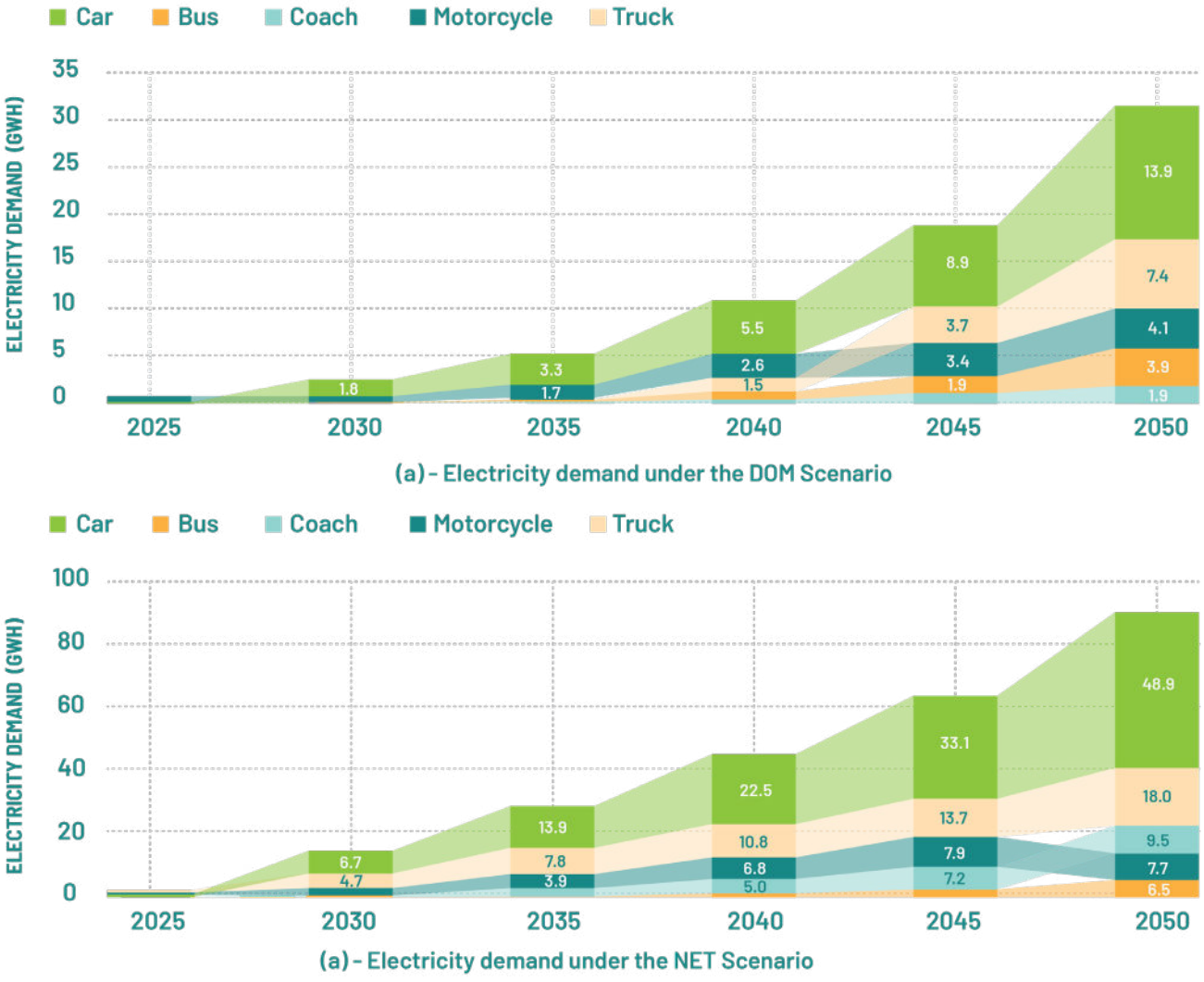


Figure 10: Trends in using electricity for various types of road motor vehicles in emission mitigation scenarios

At all times, the electricity demand for motorcycles and cars in both emission reduction scenarios always accounts for over 50% of the total electricity demand in the road sub-sector. However, there are contrasting trends in the electricity market share between motorcycles and cars in both scenarios: The electricity market share for passenger cars gradually increases while the electricity market share for motorcycles gradually decreases, showing a shift between vehicle types.

Implementing emission mitigation measures in the road sub-sector, including solutions to develop electric vehicles, can bring about significant GHG emission mitigations.

Under the BAU Scenario, GHG emissions from the transport sector could reach

273,21 million tonnes of CO2eq

in 2050

of which emissions from roads account for

87%

However, the DOM Scenario cannot bring GHG emissions in the road sub-sector below or equal to the base year. By 2050, emissions are estimated to reach

139.1 million tonnes of CO2eq

an increase of 3.6 times compared to the base year. Meanwhile, with stronger and more ambitious solutions, the NET Scenario can help lower GHG emissions than the base year.

Applying GHG emission mitigation measures in the road sub-sector can reduce up to

41,4% and 94,3%

of total GHG emissions from the road sub-sector under the DOM Scenario and the NET by 2050 Scenario.

Specifically, by 2050, GHG emissions from the road sub-sector will be about 13.52 million tonnes of CO2eq, accounting for about 44.5% of the total GHG emissions of the entire sector.

GHG emissions (million tonnes of CO_2eq)

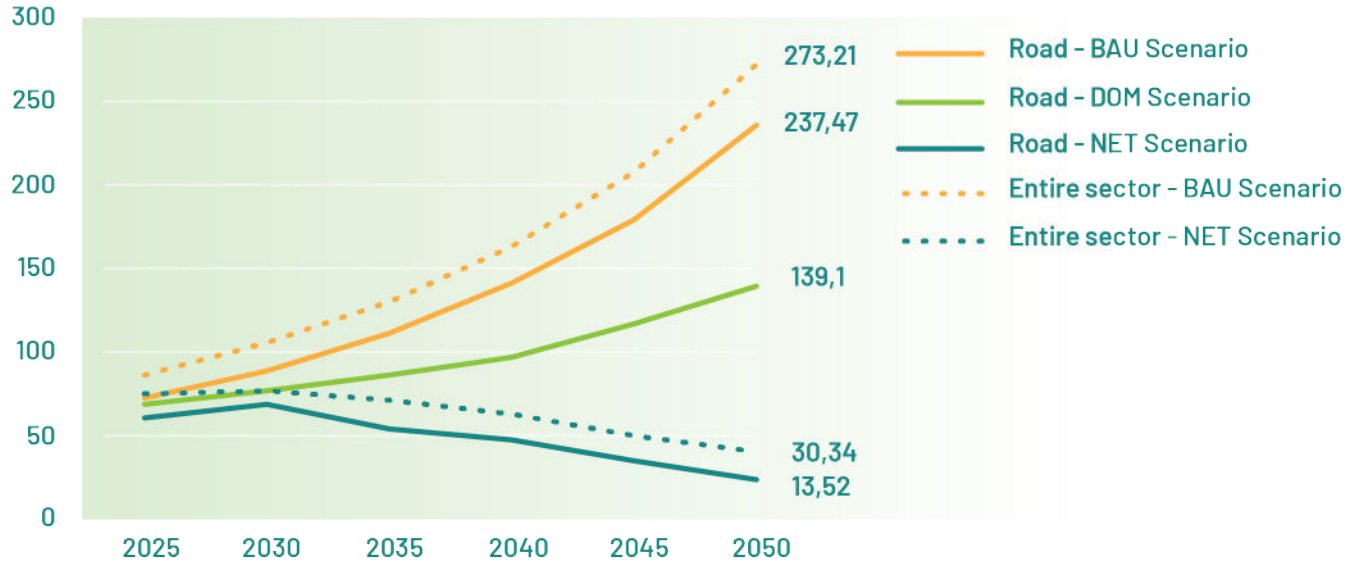


Figure 11: Potential GHG emissions mitigation of the road sub-sector under emission mitigation scenarios

The roadmap and solutions for developing electric vehicles at the national level to achieve the net-zero emission goal by 2050 are recommended to include three stages.

Startup phase (2024-2030)

Focus on shifting towards using technologies that are already popular for electric vehicles. During this period, besides pure electric vehicles (BEV), hybrid electric vehicles (HEV, PHEV) can be an intermediate and companion solution to reduce emissions when charging station infrastructure is limited. This is also a period to focus on perfecting mechanisms and policies to promote the transition and development of EVs; raising awareness, training staff and promoting production and assembly of EVs; aiding supporting industries as well as completing plans and strategies related to EV development including grid planning, charging station infrastructure which puts focus on ensuring safety and fire prevention.

Rapid growth stage (2030-2040)

Strongly deploy restrictions on vehicles using internal combustion engines, limit personal vehicles, shift modes of transport, and combine with solutions to support and subsidy taxes and fees for the production and use of EVs to aim for high goals of penetration rate of this type. Pilot technologies, equipment and vehicles using green energy such as Hydrogen and Methanol, focus on using these green energy sources for long-distance passenger cars and trucks in addition to paying attention to develop and pilot technologies for recovering and recycling waste batteries.

Stable growth phase (2040-2050)

Stop producing and selling new vehicles that use fossil fuels. Complete policy mechanisms and continue to develop to achieve a stable market penetration rate for the types of EVs mentioned in the NET scenario.

ELECTRIC VEHICLE MARKET SHARE TARGET FOR EACH VEHICLE TYPE

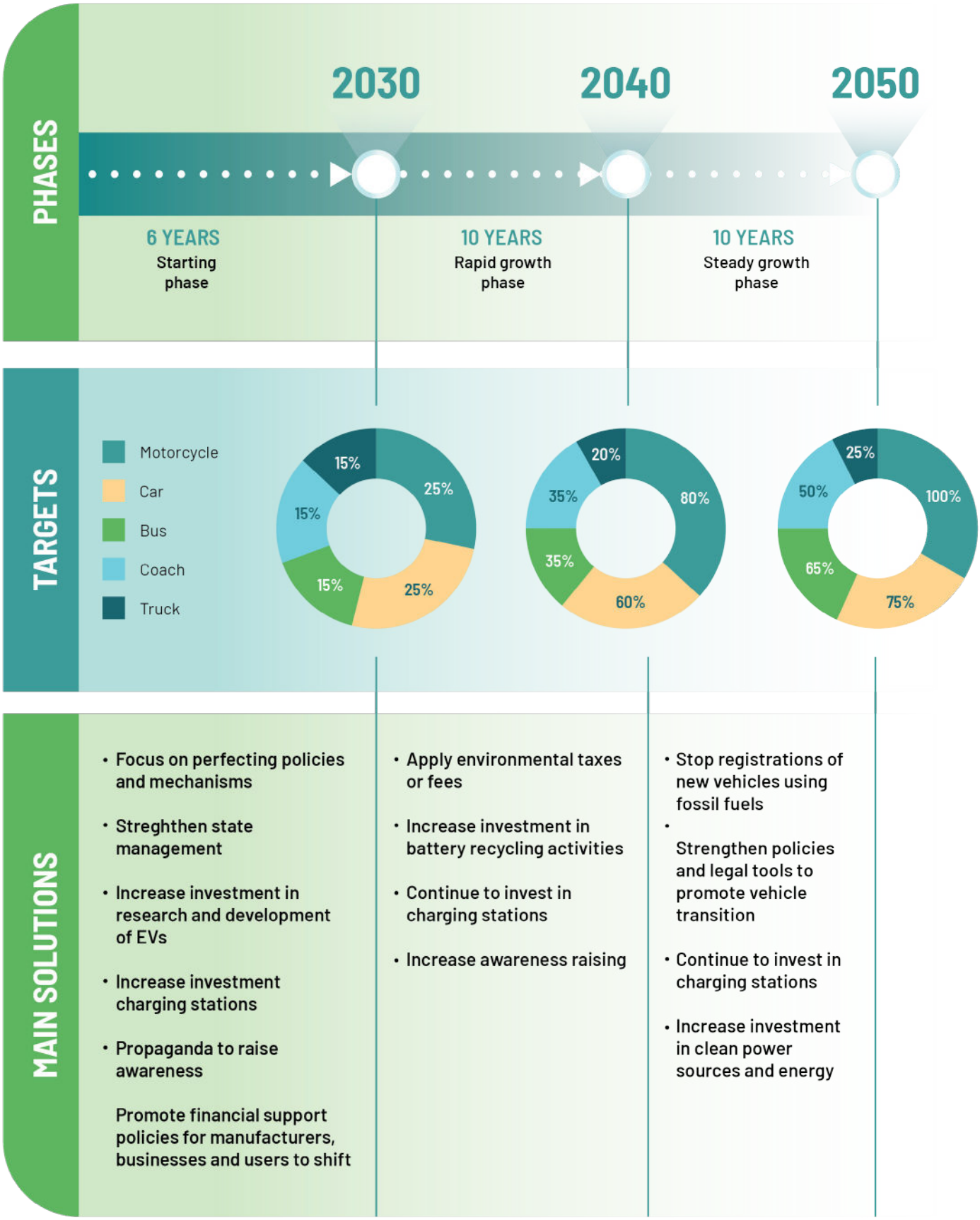


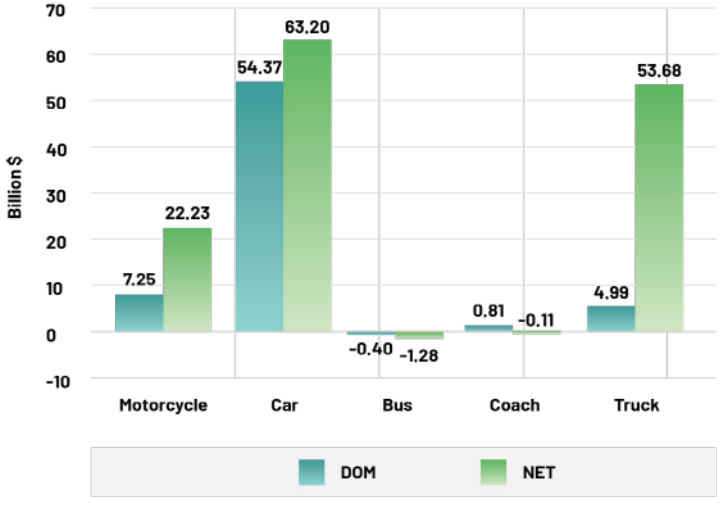
Figure 12:Recommendations for the EV roadmap of the national road transport sub-sector

Viet Nam needs to complete the policy framework soon to promote the successful implementation of the EV roadmap of the national road transport sub-sector.

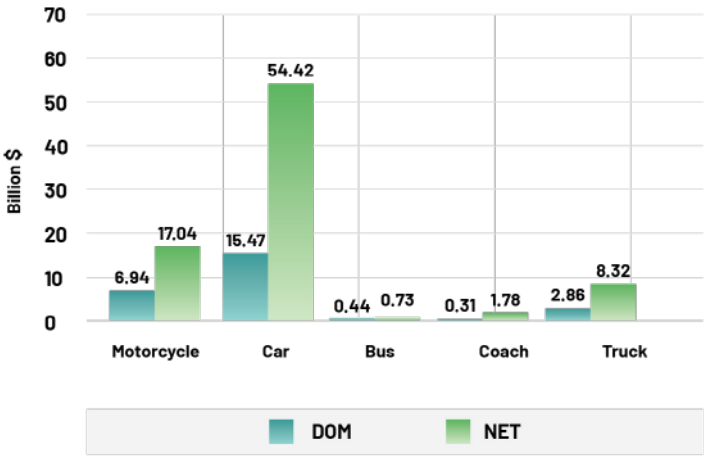
The policies that need to be focused on to quickly remove barriers to the implementation of EVs at the national level include:

Implementing the roadmap for shifting to using EVs in the road sub-sector towards the target of net zero emissions by 2050 of the entire sector will require significantly increased investment re-sources compared to the BAU Scenario and the DOM Scenario.

Under the NET Scenario, the investment costs for vehicles and infrastructure are forecast to increase by 220 billion USD and 127 billion USD compared to the BAU Scenario and the DOM Scenario, respectively. Among them, investment in electric vehicles accounts for the largest proportion.



(a) – Vehicle investment costs increase compared to the BAU Scenario



(b) – Investment costs in infrastructure increase compared to the BAU Scenario

Figure 13: Increased investment costs in vehicles and infrastructure compared to the BAU Scenario

INTERNATIONAL CLIMATE INITIATIVE (IKI)

This project is part of the International Climate Initiative (IKI). The Federal Ministry for Economic Affairs and Climate Action (BMWK) supports this initiative on the basis of a decision adopted by the German Bundestag.

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