Chapter 1

Impacts Brought by Electric Vehicles

March 2022

This chapter should be cited as

ERIA (2022), 'Impacts Brought by Electric Vehicles', in Kimura, S., Purwanto, A. J., Ueda, K., and Hiruma, T. (eds.), *Assessment of Electric Vehicle Penetration in the Lao People's Democratic Republic.* ERIA Research Project Report FY2021 No. 26, Jakarta: ERIA, pp.1-15.

Chapter 1

Impacts Brought by Electric Vehicles

1. Introduction

The transport sector in the Association of Southeast Asian Nations (ASEAN) countries accounts for 40%–60% of the total energy demand. The sector is dominated by oil (gasoline and diesel) imports, which have been increasing rapidly in parallel to the slowing down of domestic production, which affects the security of supply (Koyama and Kutani, 2012). The increased combustion of oil products has worsened the air quality, which potentially has significant socio-economic impacts.

In many cases, there has been inadequate development in infrastructure for public transport, walking, and cycling due to overbuilt roadways that accelerate greater use of private vehicles. As the public transport system is inadequate and unreliable there is often the urge to own a private vehicle or a motorised two-wheeled vehicle. This also, in turn, makes walking and cycling redundant, mainly due to unfavourable and not public-friendly walking and cycling pathways. The United States Energy Information Administration (2017) pointed out that in 2017, non-Organisation for Economic Co-operation and Development (OECD) Asian countries, including China and India, accounted for more than 70% of the increase in transport fuel consumption due to an increase in personal mobility.

Two principal ways can improve the delivery of efficient and sustainable transport infrastructure, which are the use of information and communications technology and the electrification of mobility.

This study of electric vehicle penetration in the Lao People's Democratic Republic (Lao PDR) focuses on the use of more efficient vehicle technology, propulsion, and energy. It analyses the electrification of mobility, the second principal way. Nowadays, we are witnessing electromobility as a fast-growing technological and social trend, which has become one of the main opportunities and challenges for smart cities. The opportunities lie in the fact that the penetration of electric vehicles (EVs) would help shift oil consumption to electricity, reducing on-street greenhouse gas (GHG) emissions and air pollution and reaching a higher energy efficiency in mobility. On the other hand, however, smart cities need to build smart infrastructure for EVEV electric charging (Xu et al., 2016; Wagner, Götzinger, and Neumman, 2014).

Often considered within the category of EVs are hybrid electric vehicles (HEVs), plug-in hybrid electric vehicles (PHEVs), full battery electric vehicles (BEVs), and fuel-cell hydrogen-electric vehicles (FCEVs). Electricity produced in these four EV types is different. In HEVs, electricity is produced by the braking mechanism; in PHEVs and BEVs, electricity is produced in the grid system and fed into the vehicle's battery unit during charging.

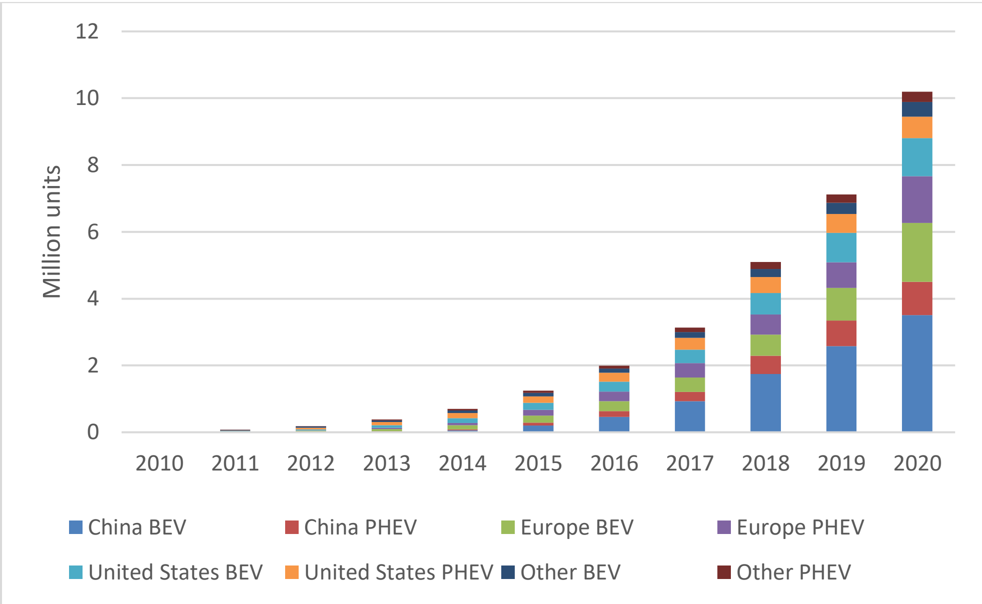
In FCEVs, electricity is produced by electrochemical oxidation of hydrogen in the vehicle's fuel cell unit that is equipped with hydrogen storage.

In this chapter we analyse the possibility of having battery electric cars in the Lao PDR in the horizon of 2040. In sections 4 and 5, we analysed the impacts of each new car technology on energy use at the national level.

2. Trends, Policies, and Possibilities

Electromobility is developing rapidly. As shown in Figure 1.1, by 2020, the global passenger electric car fleet is estimated at nearly 10.2 million, which is 3.0 million more than in the previous year and almost double the earlier sales of new electric vehicles.

Figure 1.1: Global Electric Passenger Car Stock



BEV = battery electric vehicle, PHEV = plug-in hybrid electric vehicle.
Source: IEA (2021).

China is the world's largest market for electric cars, with nearly 1.1 million sold in 2018. With 2.3 million units, it accounts for almost half of the global electric car stock, followed by Europe (1.2 million) and the United States (US) (1.1 million) (IEA, 2019). China started in 2009 with the '10 cities, 10,000 vehicles' business model to promote plug-in electric vehicle (PEV) development. However, it established targets only in June 2012: 500,000 vehicles by 2015 and 5 million by 2020. China aimed to reach new EV sales shares of 7%–10% by 2020, 15%–20% by 2025, and 40%–50% by 2030 (Marklines, 2021).

In Japan, a leading EV market, government support for BEV development started in the early 1970s191970s. Strong government commitment to promoting EVs is reflected in a heavy emphasis on research and development of vehicle and component technologies, infrastructure, and market support for EV users. The Ministry of Economy, Trade and Industry funded the Clean Energy Vehicle Introduction Project, which provided subsidies and tax discounts for purchasing EVs (Loveday, 2013).

In 2017, Japan's EV production ranked fourth in the world at around 8%, after China (50%), Europe (21%), and the US (17%) (Lutsey et al., 2018). The government works with industry stakeholders to reduce by 80% GHG emissions from domestically produced vehicles (by 90% for passenger vehicles), including exported vehicles, by 2050, with a combination of HEVs, BEVs, PHEVs, and FCEVs. Under the new policy scenario, Japan targets increasing the EV sale share of all modes (excluding two- and three-wheelers) by 21% and scaling up to 37% market share under the EV30@30 scenario in 2030. To provide more charging stations throughout Japan, in 2018 the government set the goal of having fast chargers every 9.3 miles (15 kilometres [km]) or within every 19-mile (30 km) radius (Kane, 2018). Japan's success in the EV market is due to government commitment, strong support from the automotive industry, and user-friendly infrastructure.

In 2013, the Government of India established the National Electric Mobility Mission Plan 2020 and, in 2015 enacted Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles in India (FAME India). The government announced its intention to move towards all-EV sales in 2025–2040, and through the EV30@30 programme, to ensure that EVs will account for at least 30% of all vehicle sales by 2030 (Lutsey et al., 2018; IEA, 2019). All vehicles, including two-wheelers, are targeted for electrification. EVs have penetrated the van and urban bus markets, accounting for 14% of all passenger cars and light commercial vehicles and 11% of all bus sales (IEA, 2019). As a member of the Electric Vehicle Initiative, India is dedicated to accelerating the deployment of EVs.

Only two ASEAN countries produce and commercialise PEVs – Thailand and Malaysia. Thailand's first PEV development road map – the Electric Vehicle Promotion Plan – was approved by the government in March 2015. In 2017, the Board of Investment approved incentives for manufacturers of BEVs, HEVs, and PHEVs, mostly in the form of corporate tax exemptions for 5 to 8 years. The project to develop next-generation automotive vehicles, focusing on PEVs, was included in the Eastern Economic Corridor, approved in February 2018, to spur investment. In March 2019, the Board of Investment agreed to renew the investment package for HEVs to attract more investment in PEV production. Investors had to apply to produce HEVs in 2019 and assemble BEVs within 3 years. HEV and PHEV sales rose by 24.7% in 2017 to 11,945 units whilst BEV sales reached 165 units (Nicholls et al., 2018). Vehicles sold in that year totalled 870,748 units. By 2036, Thailand targets having 1.2 million electric cars on its streets and setting up 690 charging stations.

On 8 August 2019, the Government of Indonesia issued Presidential Decree No. 55/2019, which laid the general framework to accelerate the penetration of (plug-in) battery-based electric vehicles in the country. Before that decree, the Ministry of Industry told a newspaper that the government would target sales of 400,000 EVs by 2025 to reduce GHG emissions by 29% in 2030 (Tempo.co, 2021). One source mentioned that 400,000 PEVs would be produced domestically by then. Other sources estimate that around 2 million electric-powered two-wheelers would be sold by 2025. Jakarta has around 1,000 charging stations, built by PLN (State Electricity Company) (Aji, 2017). On 23 October 2019, the government issued Regulation (PP) No. 73/2019 concerning luxury sale tax of private cars that gives advantage to low CO_2-emitting cars, including the different classes and types of EVs.

3. Methodology and Scenarios

In this study, we modelled the Lao PDR's national energy systems on the Long-Range Energy Alternatives Planning System (LEAP) software during the Working Group of ERIA's Energy Outlook and Energy Saving Potential Project organised in Jakarta on 3–7 February 2020. Historical data of the Lao PDR's energy consumption from the different sectors and the energy supply system were used to develop the model that contains the relationship between energy demand and supply and the different socio-economic and demographic assumptions, which allow long-term forecasting.

Based on this model, we developed a business-as-usual (BAU) scenario of the road transport sector in the Lao PDR to the horizon of 2040 as a benchmark scenario to assess the impacts of penetration of new technologies in the road transport vehicle fleet.

We define BAU as the scenario where the country's road transport vehicle fleet would develop to the horizon of 2040 without any penetration of electric vehicles. This scenario means that up to 2040, there will be only two kinds of road transport fuel: gasoline and diesel fuels.

We elaborated three EV scenarios representing certain penetration levels of full BEVs in the country's road passenger car fleet in 2018–2040.

The level of penetration is represented by the exogenously defined percentages of shares of BEVs in the total number of road transport vehicles in the Lao PDR in 2040. We assumed that there was no electric vehicle in the base year in all scenarios, i.e., 2018.

The three EV scenarios in the Lao PDR are:

- EV10 – a scenario where BEVs would make 10% share of the total road vehicle fleet in 2040
- EV30 – a scenario where BEVs would make 30% share of the total road vehicle fleet in 2040
- EV50 – a scenario where BEVs would make 50% share of the total road vehicle fleet in 2040

In other words, we assume that the total number of electric vehicles in the Lao PDR will grow linearly from zero electric vehicles in 2018 to reach 10%, 30%, and 50% of the total road vehicle fleet in 2040, respectively in the EV10, EV30, and EV50 scenarios. The assumptions, method, and equations used to calculate the exact number of electric vehicles differentiated by categories and types are given in section 4.2.

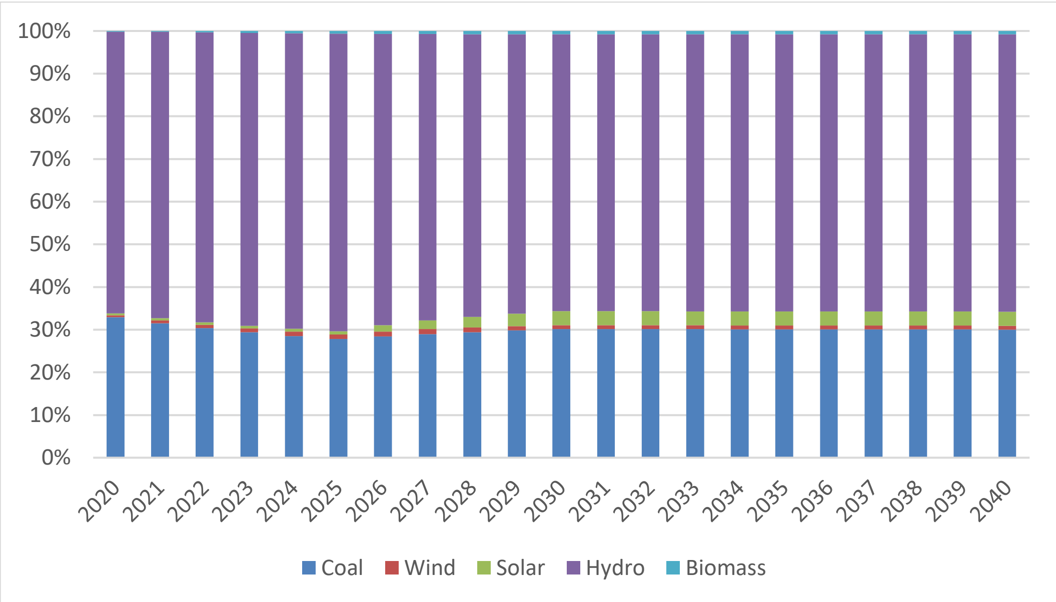
4. Assumptions of the Study

4.1. Population, GDP, and Power Generation Energy Mix

The population is expected to grow at 1.5% per year during the whole observation period. We used the projection of the International Monetary Fund (IMF, 2019) as our main source for gross domestic product (GDP) growth, i.e., the annual growth rates are 7.1% up to 2020, 6.4% in 2020-2030, and 5.7% in 2030-2040.

As shown in the Figure 1.2, we assumed that natural hydropower plants comprise 66% of the total electricity generation in 2020; whilst coal-fired plants comprise 33%; and the remaining 1% is shared between wind, solar photovoltaic (PV), and biomass plants. During the whole simulation period the share of hydro was assumed to experience a slight decrease to 65% by 2040, whilst that of coal-fired plants would also drop to 30%. The share of solar PV would increase to around 3.2% by 2040 whilst that of wind and biomass would remain below 1% each.

Figure 1.2: Fuel Share in Electricity Generation in Lao PDR



Source: Lao PDR LEAP model assumption used in the Working Group of ERIA's Energy Outlook and Energy Saving Potential Project, Jakarta, 3–7 February 2020.

4.2. Road Transport Vehicles

The total number of road transport vehicles in the future is a key assumption that would determine energy consumption and the transport sector's profile. Forecasting the future number of road transport vehicles can be estimated using the Lao PDR's future vehicle ownership rate, given the number of vehicles per 1,000 inhabitants. A usual method in estimating the vehicle ownership rate is using the vehicle ownership model developed, for example, by Dargay, Gately, and Sommer (2007). This model employs an S-shaped function, i.e. the Gompertz function, to estimate the relationship between vehicle or car in the case of Dargay, Gately, and Sommer (200720072007), ownership, and per-capita GDP.

Equation (1) $$V_{year} = \gamma . e^{\alpha . e^{\beta . GDPCAP_{year}}}$$

where

V_{year} = long-run equilibrium of car ownership rate (cars per 1,000 inhabitants at purchasing power parity)

γ = saturation level (cars per 1,000 inhabitants)

$GDPCAP_{year}$ = GDP per capita (expressed in constant local current unit of 2018)

α, β = parameters defining the shape, or curvature, of the function

Using road vehicle stock, GDP, and population data from 2000 to 2016, we calculated the vehicle ownership rate and estimated the parameters of equation (1) for all the four vehicle categories, i.e., motorbikes, cars, trucks, and buses. Table 1.1 show that 76.9% of vehicle stock in the Lao PDR by 2016 were motorbikes, 20% were cars, 2.8% were trucks, and 0.3% were buses. The 2016 road vehicle stock comprised 80% gasoline-fuelled vehicles and 20% diesel-fuelled vehicles. The total road vehicle stock in the Lao PDR grew rapidly during the period 2000–2016 at an annual average rate of 15%, whilst the two vehicle types with the fastest annual growth during the same period were diesel vans (21.4% average annual growth rate) and diesel pickups (18.4%). The estimated values of the equation (1) parameters are given in the Table 1.2.

Table 1.1: Road Vehicle Stock Data of Lao PDR

Fuel Type	Gasoline	Gasoline	Gasoline	Diesel	Diesel	Diesel	Diesel	Diesel
Vehicle Category	Motorbike		Car				Truck	Bus
Vehicle Type	Two-wheeler	Three-wheeler	Sedan	Pickup	Van	Jeep	Truck	Bus
2000	153,781	4,347	8,045	15,074	2,199	3,970	8,424	1,831
2001	168,379	4,405	8,995	17,581	2,603	4,355	10,559	1,899
2002	195,353	4,405	9,428	19,042	2,691	4,584	11,346	2,042
2003	196,963	6,407	9,696	25,490	2,729	5,832	11,841	2,164
2004	285,740	7,871	10,063	38,214	3,777	6,949	13,085	2,179
2005	337,719	8,043	11,204	45,029	4,862	7,909	13,441	2,199
2006	453,158	8,441	12,939	60,352	7,236	8,668	15,296	2,200
2007	509,421	8,518	14,792	68,360	10,355	9,399	17,994	2,242
2008	623,310	8,460	15,203	77,616	12,675	9,752	19,070	2,520
2009	711,800	8,624	17,671	93,080	18,634	10,801	23,031	2,707
2010	804,087	8,542	21,638	109,362	24,727	12,155	25,452	2,825
2011	899,685	8,554	28,096	128,892	32,667	14,169	28,873	3,203
2012	1,005,047	8,588	35,514	147,497	37,831	17,231	33,460	3,532
2013	1,112,072	8,601	43,860	162,633	50,124	19,876	38,454	3,861
2014	1,218,379	8,737	51,284	185,086	42,770	22,515	44,293	4,120
2015	1,318,107	8,761	58,871	204,360	47,553	26,665	48,739	4,448
2016	1,413,990	8,879	65,699	225,060	49,061	30,223	52,443	4,665

Source: Ministry of Public Works and Transport, Lao PDR (2019).

Table 1.2: Estimated Parameters of Equation (1)

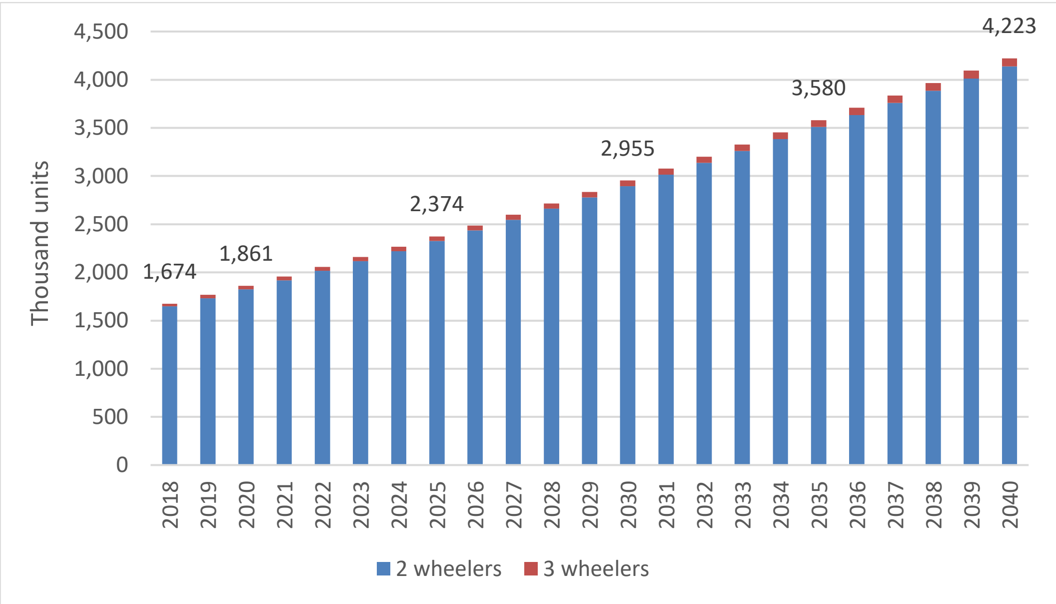
Parameters	Estimated Value			
	Vehicle Category			
	Motorbike	Car	Truck	Bus
γ	750	220	18	1.6
α	−6	−5.7	−3.5	−2.1
β	-9.10^{-4}	$-8.9.10^{-4}$	-9.10^{-4}	-6.10^{-4}

Source: Authors' calculation.

Combined with the Lao PDR's estimated future population, we obtained the estimated number of motorbikes, cars, and trucks and buses in Figure 1.3, Figure 1.4, and Figure 1.5, respectively. We classified road vehicles into four categories: motorbike, car, truck, and bus. The motorbike category is further divided into two motorbike types: two- and three-wheelers, whilst the car category is divided into four car types: sedan, pickup, van, and jeep. We use the 2016 data to calculate the share of each vehicle type in each category. These shares are assumed to remain the same during the 2018–2040 period, so that the units of vehicle in a particular type are calculated by simply multiplying the total units of vehicle in the corresponding category with the vehicle type's share.

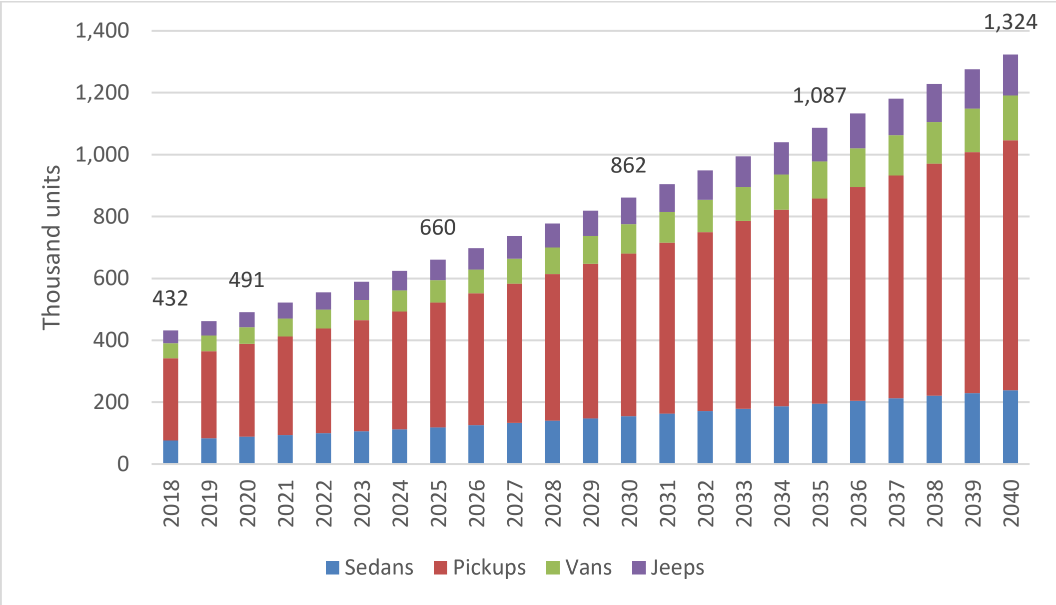
We expected that the number of motorbikes would grow at an annual rate of 5% per annum until 2025 and then at 3.4% per annum until 2040. The number of cars is expected to grow at an annual rate of 6% until 2025 and then 4% until 2040. Trucks and buses together were expected to grow at 4.4% per year until 2025 and then at 3.6% per year until 2040.

Figure 1.3: Estimated Number of Motorbikes



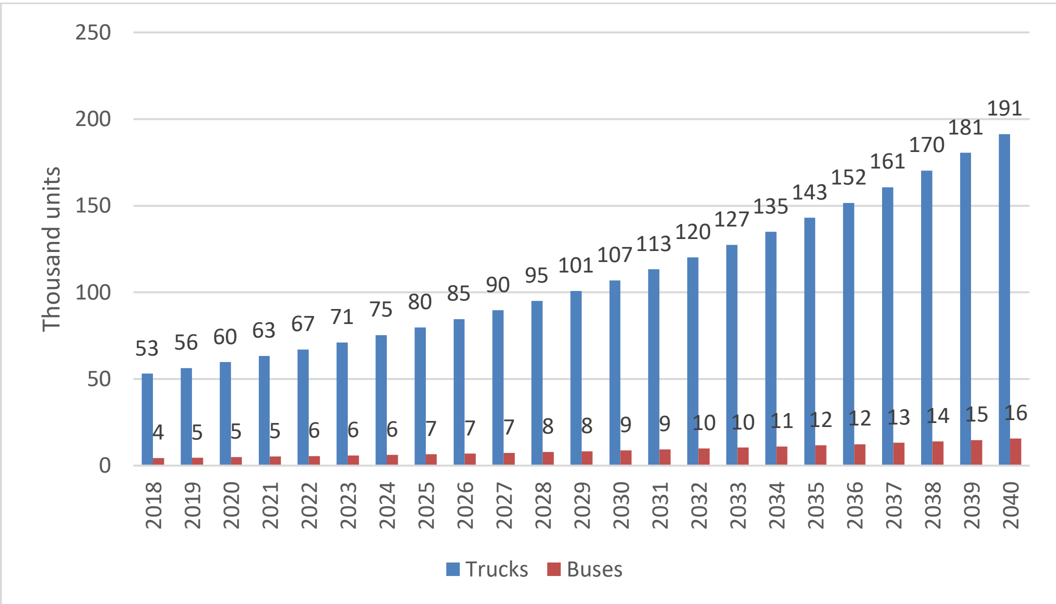
Source: Authors' calculation.

Figure 1.4: Estimated Number of Cars



Source: Authors' calculation.

Figure 1.5: Estimated Number of Trucks and Buses



Source: Authors' calculation.

Table 1.3 shows our assumptions in the electric vehicle scenarios that consist mainly of fuel economy of internal combustion engine (ICE) vehicles, battery efficiency of electric vehicles and average yearly kilometres travelled.

Table 1.3: Kilometres Travelled, Fuel Economy, and Battery Efficiency Assumptions

Variable	unit	**Motorbikes**		**Cars**				**Trucks**	**Buses**	**Sources**
		gasoline	Gasoline	gasoline	diesel	diesel	diesel			
		Two-wheelers	Three-wheelers	Sedans	Pickup	Van	Jeep	diesel	Diesel	
ICE vehicle fuel economy	km/litre	35	35	12	15	8.5	8.5	7	4.5	Ministry of Public Works and Transport, Lao PDR (2019) and authors' estimates
Electric vehicle battery efficiency	km/kWh	12	12	5	5	5	5	0.9	0.6	Buses and Trucks: IEA (2019) Other modes: Ministry of Public Works and Transport, Lao PDR (2019) and authors' estimates
Kilometres travelled	km/year	4,380	3,650	6,570	14,000	15,000	5,110	37,500	44,800	Ministry of Public Works and Transport, Lao PDR (2019)

ICE= internal combustion engine, km = kilometre, kWh = kilowatt hour.

Source: authors' elaboration from various sources.

Table 1.4 gives the basic equations to calculate road vehicle stock in each vehicle category and type. Electric vehicle (EV) penetration in each vehicle type was assumed to increase from 0% in 2018 to reach x% in 2040 where x is 10%, 30%, and 50% that correspond respectively to EV10, EV30, and EV50 scenarios. The number of non-EV vehicle units in each vehicle category and type is the number of the corresponding vehicle category or type deduced by the assumed number of electric vehicles of that category or type.

Table 1.4: Basic Equations for Electric Vehicle Scenarios

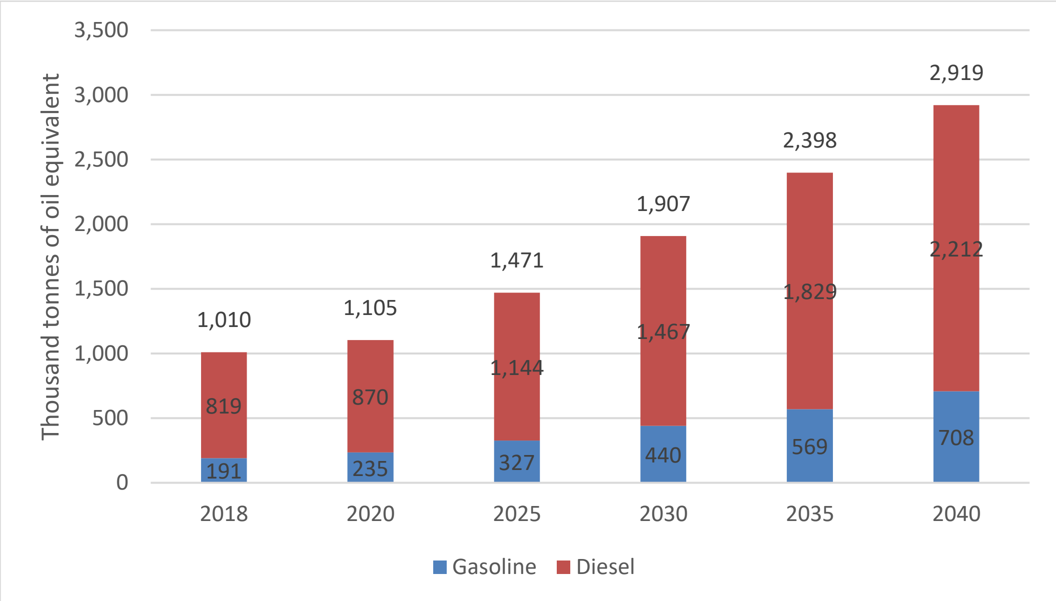
<table>
<tr><th>Variable</th><th>Description</th><th>Unit</th><th>2018</th><th>2019–2039</th><th>2040</th></tr>
<tr><td>$TOTCAT_{year,cat}$</td><td>Total number of vehicle units per vehicle category</td><td>million units of vehicle</td><td>$TOTCAT_{year,motorbike}$: 1.67
$TOTCAT_{year,car}$: 0.43
$TOTCAT_{year,truck}$: 0.06
$TOTCAT_{year,bus}$: 0.01</td><td colspan="2">See equation (1) and Table 1.1 for the corresponding vehicle category (cat) parameter values</td></tr>
<tr><td>$TOTYPE_{year,2\text{-}wheelers}$</td><td rowspan="8">Total number of vehicle units per vehicle type</td><td rowspan="8">million units of vehicle</td><td>1.65</td><td colspan="2">$\left(TOTCAT_{year,motorbike} - BEV_{year,2-wheelers}\right).0.98$</td></tr>
<tr><td>$TOTYPE_{year,3\text{-}wheelers}$</td><td>0.03</td><td colspan="2">$\left(TOTCAT_{year,motorbike} - BEV_{year.3-wheelers}\right).0.02$</td></tr>
<tr><td>$TOTYPE_{year,sedan}$</td><td>0.08</td><td colspan="2">$\left(TOTCAT_{year,car} - BEV_{year,sedan}\right).0.18$</td></tr>
<tr><td>$TOTYPE_{year,pickup}$</td><td>0.27</td><td colspan="2">$\left(TOTCAT_{year,car} - BEV_{year.pickup}\right).0.61$</td></tr>
<tr><td>$TOTYPE_{year,van}$</td><td>0.05</td><td colspan="2">$\left(TOTCAT_{year,car} - BEV_{year,van}\right).0.11$</td></tr>
<tr><td>$TOTYPE_{year,jeep}$</td><td>0.04</td><td colspan="2">$\left(TOTCAT_{year,car} - BEV_{year,jeep}\right).0.10$</td></tr>
<tr><td>$TOTYPE_{year,truck}$</td><td>0.06</td><td colspan="2">$\left(TOTCAT_{year,truck} - BEV_{year,truck}\right)$</td></tr>
<tr><td>$TOTYPE_{year,bus}$</td><td>0.01</td><td colspan="2">$\left(TOTCAT_{year,bus} - BEV_{year,bus}\right)$</td></tr>
<tr><td>$BEVSH_{type,year}$</td><td>Share of BEV based on scenarios</td><td>%</td><td>0</td><td>$\frac{x.(year-2017)}{(2050-2017)}$</td><td>$x$; which is the BEV share target in each scenario</td></tr>
<tr><td>$BEV_{type,year}$</td><td>Number of BEVs</td><td>million cars</td><td>0</td><td colspan="2">$TOTCAT_{year}.BEVSH_{year}$</td></tr>
</table>

ICE = internal combustion engine, BEV = battery electric vehicle.
Source: Authors' elaboration.

4.3. Business-as-Usual Scenario

Figure 1.6 shows that the total energy consumption of road transport vehicles in the Lao PDR would increase from around 1,010 thousand tonnes oil equivalent (ktoe) in 2018 to around 2918 ktoe in 2040, i.e., a 4.9% yearly increase in that period. With 6.1% average annual growth rate, gasoline is expected to grow faster than diesel (4.6%). Gasoline and diesel shares are 19% and 81% in 2018 and it would be 24% and 76% in 2040. These figures of the BAU scenario matched almost perfectly to the BAU scenario noted in the Ministry of Energy and Mines Lao PDR and ERIA (2018 and 2020a).

Figure 1.6: Gasoline and Diesel Consumption of Road Transport Vehicles – BAU Scenario



BAU = business-as-usual.
Source: LEAP model running results (2021).

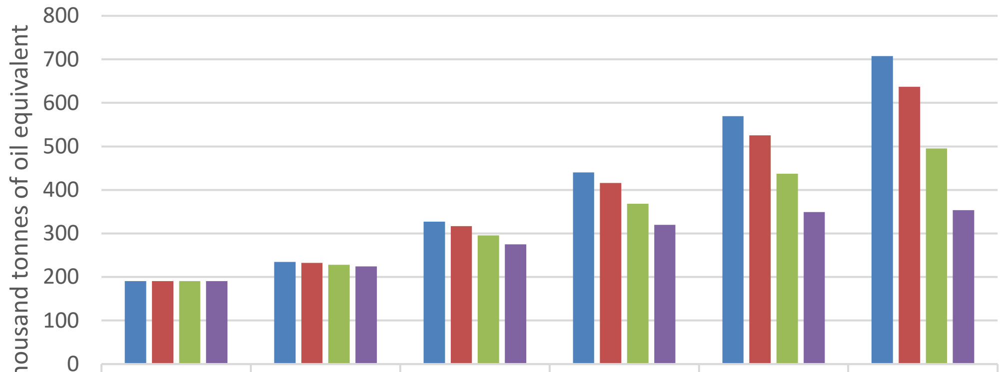
5. Results

Conventional fuel consumption, i.e. gasoline and diesel fuel, would decrease proportionally with the increasing penetration rate of electric vehicles.

Gasoline consumption in the BAU scenario would reach around 708 ktoe by 2040, whilst that in the EV50 scenario would reach only half of it, i.e., around 354 ktoe as shown in Figure 1.7. The average yearly growth rate in the period 2018-2040 would decrease from 6.2% in the BAU scenario to 5.6%, 4.4%, and 2.9%, respectively in the EV10, EV30, and EV50 scenarios.

In terms of saving, Figure 1.8 shows that the EV10 scenario would potentially save nearly 85,000 kilolitres of gasoline by 2040, whilst that of EV50 would save nearly 425,000 kilolitres.

Figure 1.7: Gasoline Consumption by Scenarios

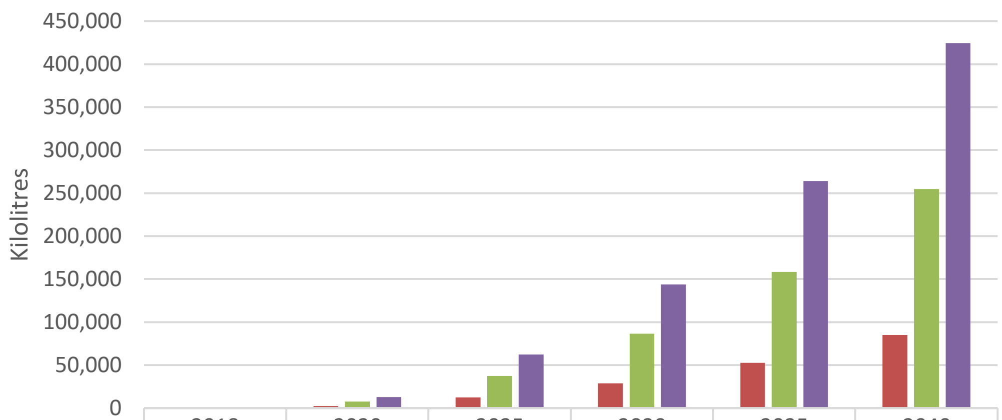


	2018	2020	2025	2030	2035	2040
BAU	191	235	327	440	569	708
EV10	191	233	317	416	525	637
EV30	191	228	296	368	437	495
EV50	191	224	275	320	349	354

BAU = business-as-usual.

Source: LEAP model running results (2021).

Figure 1.8: Gasoline Saving by Electric Vehicle Scenarios



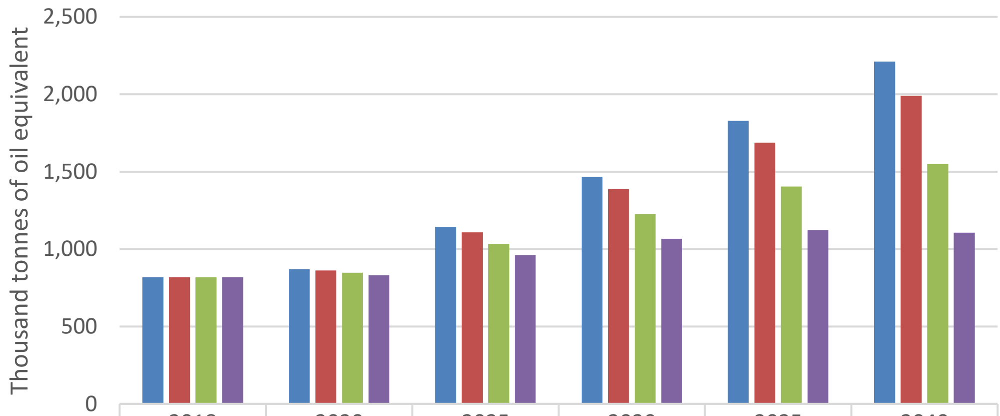
	2018	2020	2025	2030	2035	2040
EV10	0	2,555	12,477	28,793	52,788	84,892
EV30	0	7,678	37,455	86,380	158,340	254,689
EV50	0	12,801	62,422	143,967	263,891	424,486

Source: LEAP model running results (2021).

The electrification of diesel-fuelled road transport vehicles by 50% (EV50 scenario) would reduce the diesel fuel consumption in the BAU scenario from around 2,200 ktoe to around 1,100 in 2040 (Figure 1.9). The average yearly growth rate in the period 2018–2040 would decrease from 4.6% in the BAU scenario to 4.1%, 2.9%, and 1.4% respectively in the EV10, EV30 and EV50 scenarios.

The saving potential of the electric vehicle penetration scenarios would range from 239,000 kilolitres in the EV10 scenario to nearly 1.2 million kilolitres in the EV50 scenario as shown in Figure 1.10.

Figure 1.9: Diesel Fuel Consumption by Scenarios

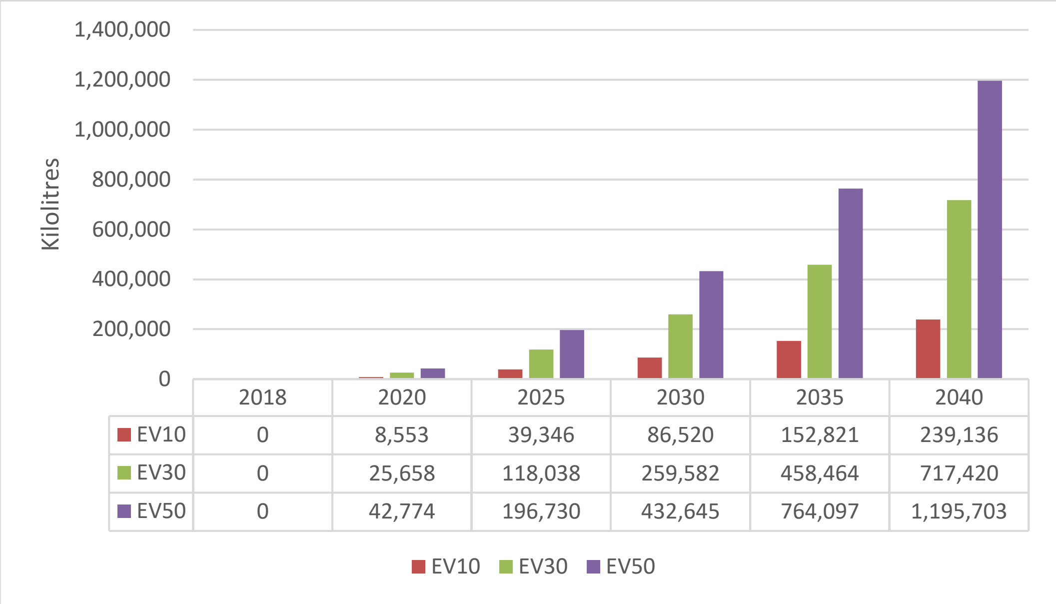


	2018	2020	2025	2030	2035	2040
BAU	819	870	1,144	1,467	1,829	2,212
EV10	819	862	1,107	1,387	1,688	1,991
EV30	819	846	1,035	1,227	1,405	1,548
EV50	819	831	962	1,067	1,122	1,106

BAU EV10 EV30 EV50

BAU = business-as-usual, EV = electric vehicle.
Source: LEAP model running results (2021).

Figure 1.10: Diesel Fuel Saving by Electric Vehicle Scenarios



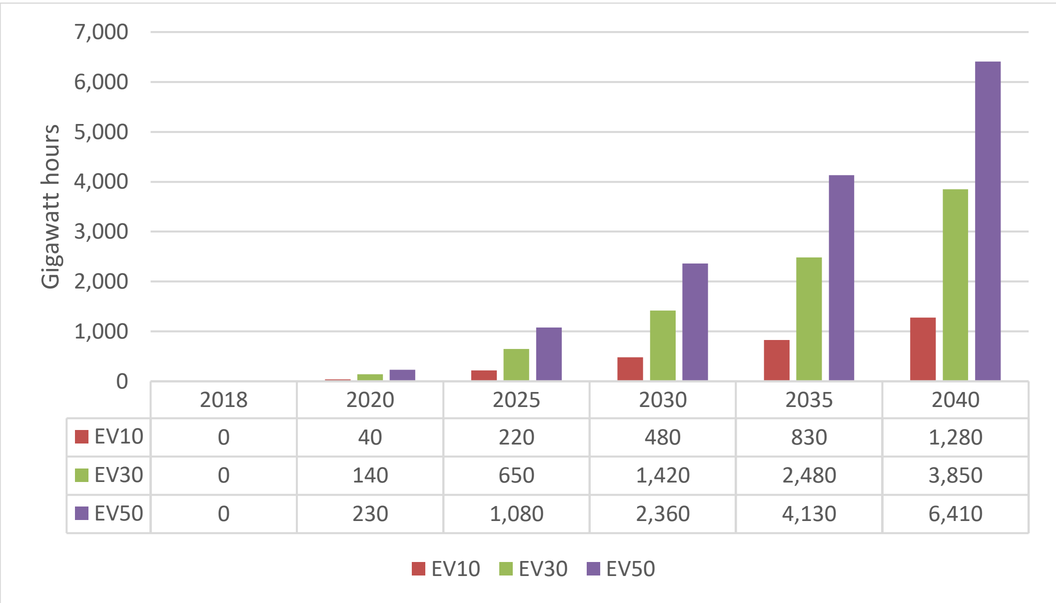
	2018	2020	2025	2030	2035	2040
EV10	0	8,553	39,346	86,520	152,821	239,136
EV30	0	25,658	118,038	259,582	458,464	717,420
EV50	0	42,774	196,730	432,645	764,097	1,195,703

EV = electric vehicle.

Source: LEAP model running results (2021).

The electric power needed for the road transport electric vehicles in the three scenarios is given in Figure 1.11. A 10% penetration scenario (EV10) would need nearly 1,300 gigawatt hours in 2040, whilst that of EV30 and EV50 would be around 3,850 and 6,400 gigawatt hours, respectively.

Figure 1.11: Electricity Consumption of Road Transport Electric Vehicles



	2018	2020	2025	2030	2035	2040
EV10	0	40	220	480	830	1,280
EV30	0	140	650	1,420	2,480	3,850
EV50	0	230	1,080	2,360	4,130	6,410

Source: LEAP model running results (2021).