

# Chapter 4

## Analysis on Impacts to the National Economy and the Oil Industry

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## Chapter 4

### Analysis on Impacts to the National Economy and the Oil Industry

Chapter 4 clarifies the impacts to the national economy and oil industry by electric vehicle (EV) penetration scenarios. EV penetration will decrease the demand of gasoline and diesel oil in 2040 compared with BAU scenario (which means without EV penetration), and the decreased volume of demand increases as the EV penetration rate increases.

Decreasing oil demand will reduce oil imports and contribute to improving the trade balance. In addition, the decrease in oil imports has the effect of boosting the gross domestic product by 0.5%–2.4% depending on the EV penetration rate. These are a positive impact for the national economy. On the other hand, declining oil demand will reduce government revenues and adversely affect the oil industry, including a decrease in sales amount, number of employees, and number of service stations compared with BAU in 2040. However, oil demand will increase from the current level even if EV penetration proceeds, so the EV 10% and EV 30% scenarios are unlikely to have a serious impact. However, in the EV 50% scenario, the impact could be significant as oil demand growth flattens towards 2040.

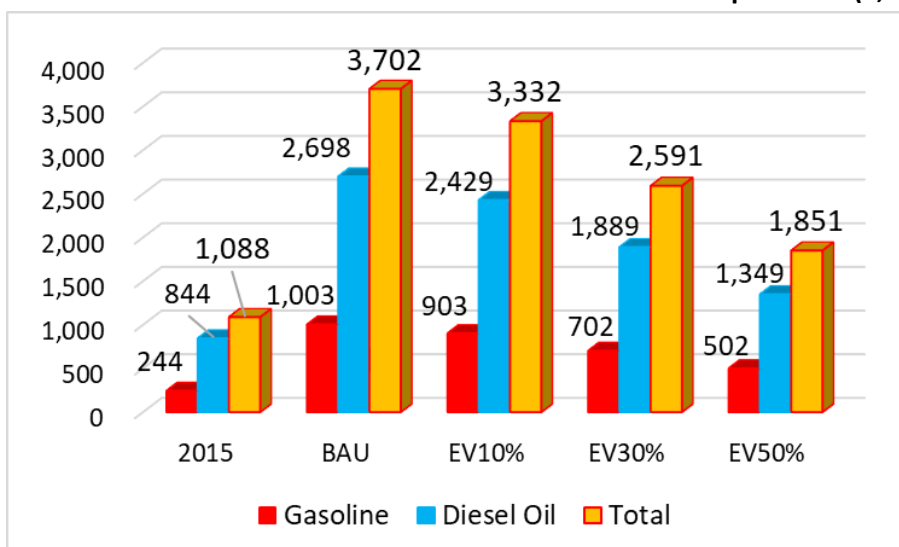
In addition, it should be noted, in this chapter, the unit of oil demand is expressed in kilolitres (kl), which is suitable for analysing the impact to oil industry.

#### **1. Impact on the National Economy**

##### **1.1. Decreased Demand for Gasoline and Diesel Oil for Transportation**

The demand for gasoline and diesel oil for transportation in 2040 are estimated in ERIA Outlook: 1,003 thousand kilolitres (kl) and 2,698 thousand kl, respectively. The total demand for gasoline and diesel oil for transportation is 3,702 thousand kl (Kimura and Phoumin, 2021). This is the BAU case. Through the EV penetration scenario, the demand for gasoline for transportation will decrease to 903 thousand kl in the EV 10% scenario, 702 thousand kl in the EV 30% scenario, and 502 thousand kl in the EV 50% scenario, whilst the demand for diesel oil for transportation will decrease to 2,429 thousand kl in the EV 10% scenario, 1,889 thousand kl in the EV 30% scenario, and 1,349 thousand kl in the EV 50% scenario.

**Figure 4.1: Demand for Gasoline and Diesel Oil in 2040 for Transportation (1,000 kl)**



BAU = business-as-usual, kl = kilolitre.

Source: Author's calculation.

The demand for gasoline and diesel oil in the BAU scenario compared to the EV penetration scenarios are shown Table 4.1.

**Table 4.1: Estimation of Demand for Gasoline and Diesel Oil by EV Penetration Scenario Compared to BAU in 2040 (1,000 kl)**

	2015	BAU	EV 10%	EV 30%	EV 50%
Gasoline	244	1,003	903	702	502
Diesel Oil	844	2,698	2,429	1,889	1,349
<b>Total</b>	<b>1,088</b>	<b>3,702</b>	<b>3,332</b>	<b>2,591</b>	<b>1,851</b>

BAU = business-as-usual, kl = kilolitre.

Source: Authors' calculation.

## 1.2. Decreased Import Value of Gasoline and Diesel Oil

### Result in 2015

The total import value of the Lao PDR in 2015 was \$6,462 million with the total import value of gasoline and diesel oil estimated at \$672 million. It is 10.4 % of the total.

**Table 4.2: Total Import Value of Lao PDR in 2015**

Items	\$1,000	%
Machines/parts	1,368,000	21.2
Vehicles/parts	1,127,000	17.4
Fossil fuel/electricity	969,000	15.0
Agriculture, livestock, food	833,000	12.9
Steel	654,000	10.1
Others	1,511,000	23.4
<b>Total</b>	<b>6,462,000</b>	<b>100.0</b>

Source: Laos Japan External Trade Organization Annual Report 2015.

**Table 4.3: Import Value of Gasoline and Diesel Oil in 2015**

	Import Volume (1,000 kl)	CIF Price \$/kl	Import Value (\$1,000)
Gasoline	255	577	147,263
Diesel Oil	889	590	524,734
<b>Total</b>	<b>1,145</b>	<b>-</b>	<b>671,997</b>

CIF = cost, insurance, and freight.

Source: Lao State Fuel Oil Company. Lao PDR Energy Statistics (2018).

#### ***Estimation of Import Value of Gasoline and Diesel Oil in 2040***

The import value of gasoline and diesel oil in 2040 is estimated by using the cost, insurance, and freight price of each product in 2015 and import volume of each product by EV penetration scenario.

In the BAU case, the total import value of gasoline and diesel oil in 2040 is estimated at \$2,170,993 thousand. The in the BAU case and the EV10, EV30, EV 50 scenarios are shown in Table 4.4.

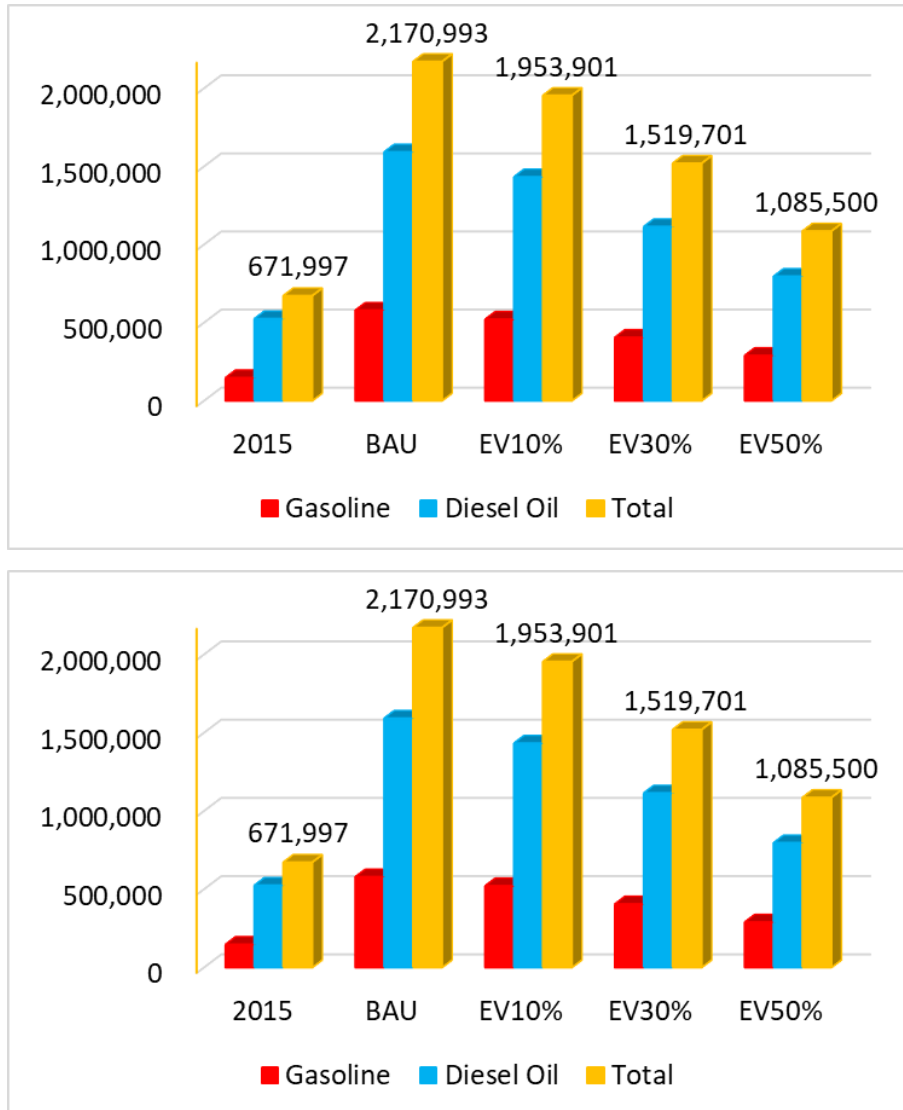
**Table 4.4: Import Value in 2040 by EV Penetration Scenario (\$1,000)**

	BAU	EV 10%	EV 30%	EV 50%
Gasoline	578,945	521,053 (-10%)	405,263 (-30%)	289,472 (-50%)
Diesel Oil	1,592,049	1,432,847 (-10%)	1,114,438 (-30%)	796,028 (-50%)
<b>Total</b>	<b>2,170,993</b>	<b>1,953,900 (-10%)</b>	<b>1,519,701 (-30%)</b>	<b>1,085,500 (-50%)</b>

BAU = business-as-usual, EV = electric vehicle.

Source: Authors' calculation.

**Figure 4.2: Import Value of Gasoline and Diesel Oil by EV Penetration in 2040 (\$1,000)**



BAU = business-as-usual, EV = electric vehicle.

Source: Authors' calculation.

***Decreased Import Value of Gasoline and Diesel Oil from BAU***

The decreased import value of gasoline and diesel oil by EV penetration scenario from the BAU case is shown in Table 4.5.

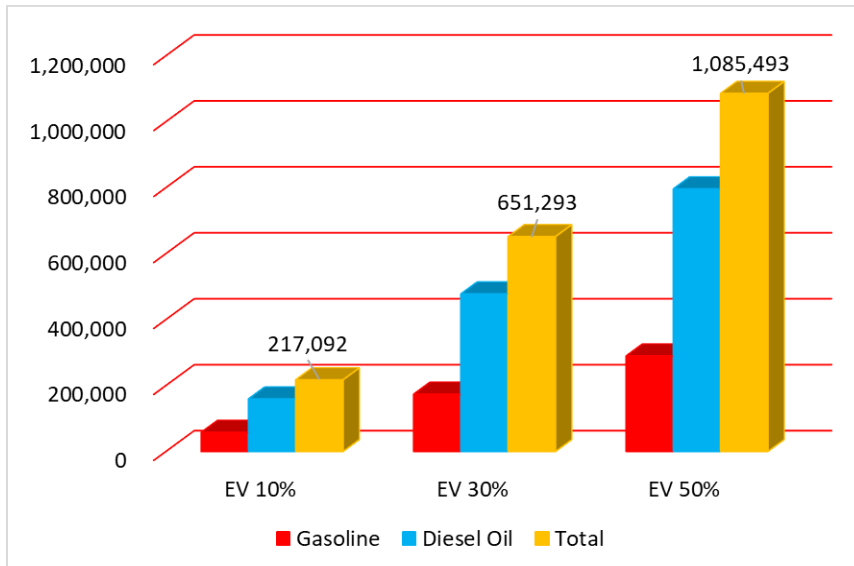
**Table 4.5: Decreased Import Value of Gasoline and Diesel Oil in 2040 Compared with BAU (\$1,000)**

	EV 10%	EV 30%	EV 50%
Gasoline	57,891	173,682	289,472
Diesel Oil	159,201	477,611	796,021
<b>Total</b>	<b>217,092</b>	<b>651,293</b>	<b>1,085,493</b>

BAU = business-as-usual.

Source: Authors' calculation.

**Figure 4.3: Decreased Import Value of Gasoline and Diesel Oil in 2040 with BAU (\$1,000)**



Source: Authors' calculation.

### 1.3. Decrease of Government Revenue Compared with BAU Case

Government revenues are taxes and duties, road fees, and the government reserve fund.

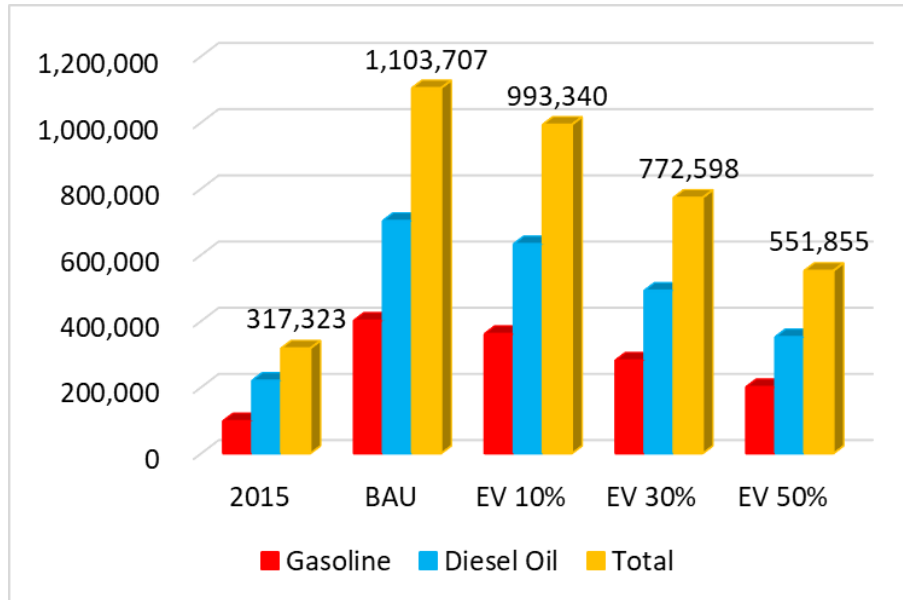
**Table 4.6: Government Revenue (\$/litre)**

	Gasoline	Diesel Oil
Taxes and Duties	0.3133	0.1740
Road Fee	0.0494	0.0494
Government Reserve Fund	0.0370	0.0370
<b>Total</b>	<b>0.3997</b>	<b>0.2604</b>

Source: Lao State Fuel Oil Company.

As shown in Tabl, government revenue in 2040 by EV penetration scenario can be estimated and decrease of Government revenue by EV penetration scenario can be estimated compared with BAU case.

**Figure 4.4: Government Revenue in 2040 by EV Penetration Scenario (\$1,000)**



BAU = business-as-usual, EV = electric vehicle.

Source: Authors' calculation.

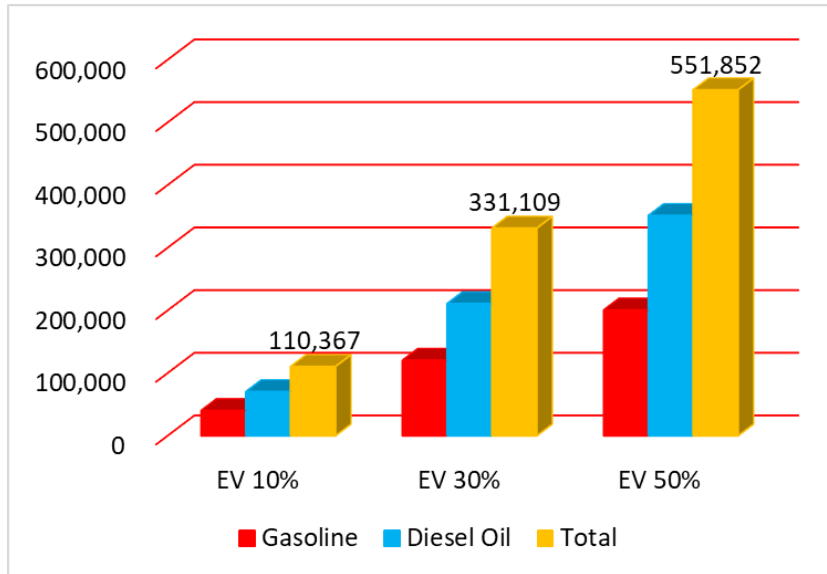
**Table 4.7: Government Revenue in 2040 by EV Penetration Scenario (\$1,000)**

	2015	BAU	EV 10%	EV 30%	EV 50%
Gasoline	97,479	401,047	360,945	280,734	200,524
Diesel Oil	219,844	702,660	632,396	491,864	351,332
<b>Total</b>	<b>317,323</b>	<b>1,103,707</b>	<b>993,340</b>	<b>772,598</b>	<b>551,855</b>

BAU = business-as-usual, EV = electric vehicle.

Source: Authors' calculation.

**Figure 4.5: Decrease of Government Revenue Compared with BAU Case**



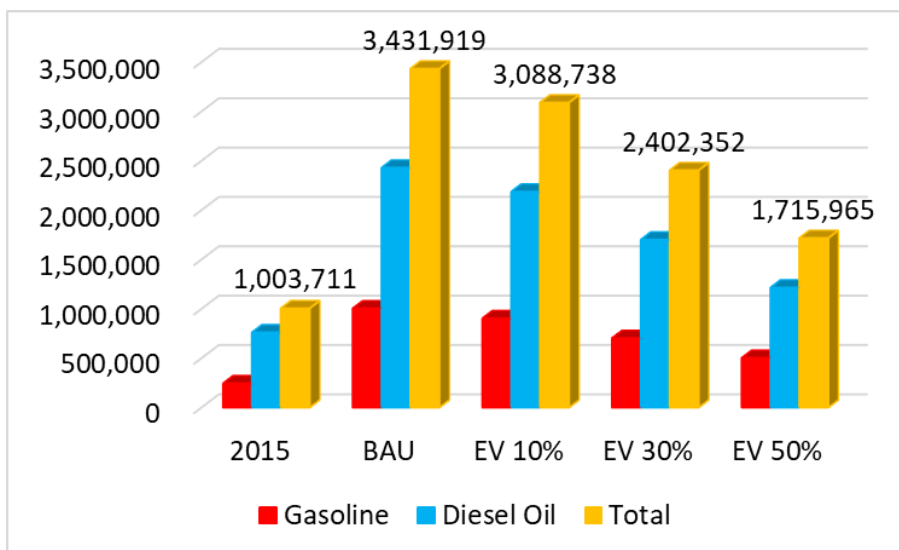
BAU = business-as-usual.  
Source: Authors' calculation.

## 2. Impact on Oil industry

### 2.1. Decreased Sales Amount of Gasoline and Diesel Oil

In the BAU case of 2040, the sales amount will expand to about \$3,432,000,000, but in the EV 50% case it will be half, but 1.7 times that of 2015. The retail price is set at \$1.0re/litre for gasoline and \$0.9re/litre for diesel oil.

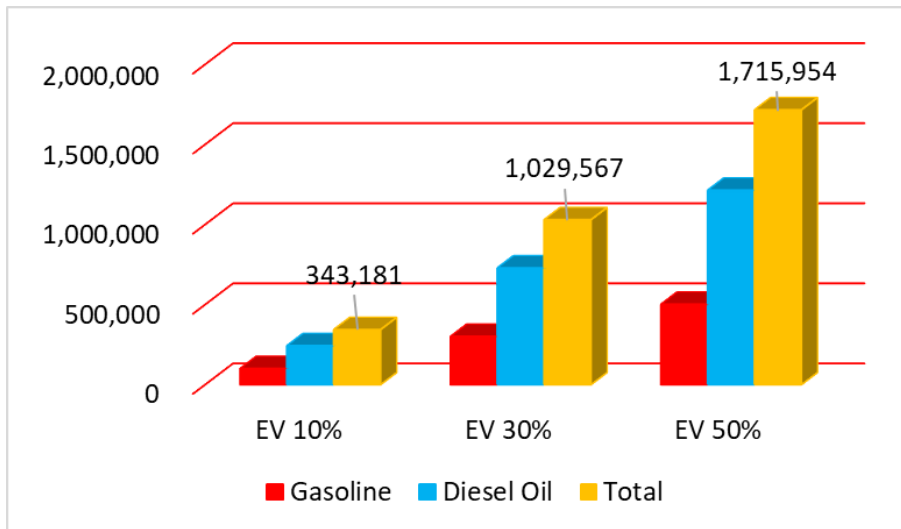
**Figure 4.6. Sales Amount in 2015 and 2040 (\$1,000)**



BAU = business-as-usual.  
Source: Authors' calculation.



**Figure 4.7: Decreased Sales Amount Compared with BAU Case (\$1,000)**



BAU = business-as-usual.

Source: Authors' calculation.

**Table 4.8: Sales Amount by EV Penetration Scenario in 2040 (\$1,000)**

	2015	BAU	EV 10%		EV 30%		EV 50%	
Gasoline	243,881	1,003,370	903,039	-10%	702,362	-30%	501,685	-50%
Diesel Oil	759,831	2,428,549	2,185,700	-10%	1,699,990	-30%	1,214,280	-50%
<b>Total</b>	<b>1,003,711</b>	<b>3,431,919</b>	<b>3,088,738</b>	<b>-10%</b>	<b>2,402,352</b>	<b>-30%</b>	<b>1,715,965</b>	<b>-50%</b>

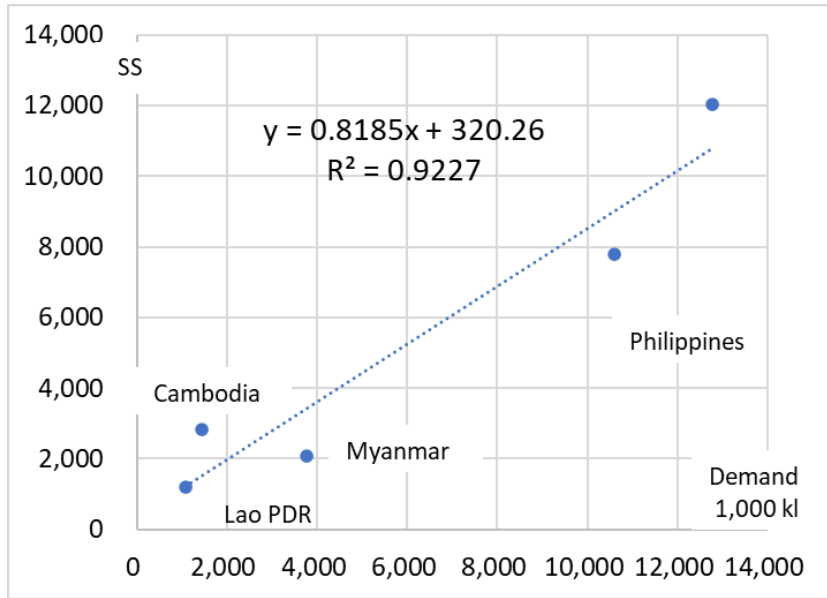
BAU = business-as-usual

Source: Author's calculation.

## 2.2. Decrease in Number of Service Stations by EV Penetration

The number of service stations in the Lao PDR in 2015 was 1,200. The number of service stations depends on the demand for gasoline and diesel oil. Figure 4.8 shows the relation between the number of service stations and the demand in neighbouring countries.

**Figure 4.8: Relation Between Number of Service Stations and Demand**



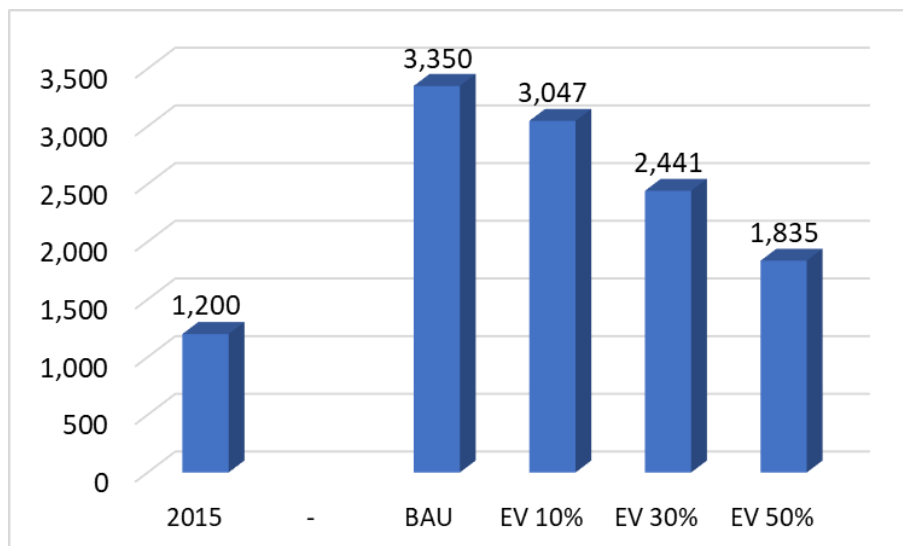
kl = kilolitre, SS = service station.

Note: Demand = Gasoline + Diesel Oil.

Source: Authors' calculation.

The approximate line is estimated. Using this formula, the number of service stations in 2040 by EV penetration can be estimated.

**Figure 4.9: Estimation of Number of Service Stations in 2040 by EV Penetration**

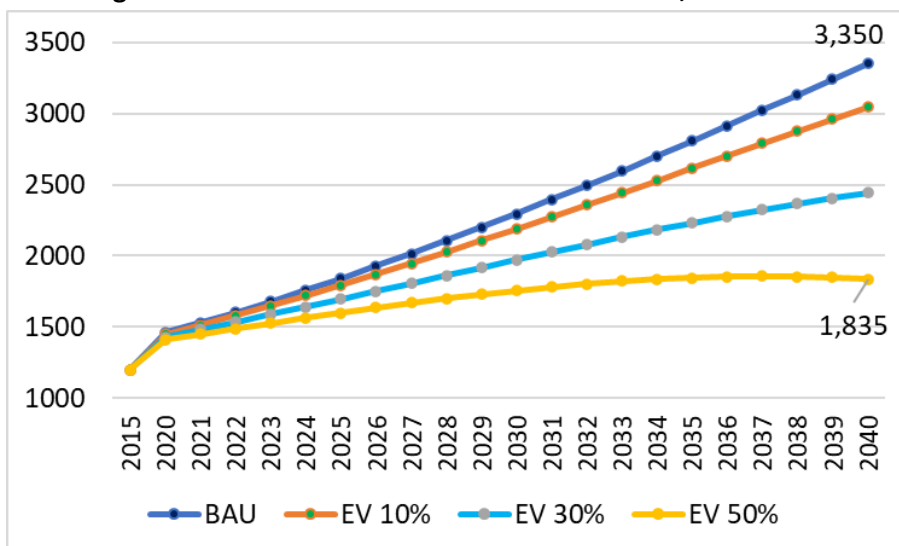


BAU = business-as-usual, EV = electric vehicle.

Source: Authors' calculation.

The number of service stations in 2040 in the BAU case is 3,350, in the EV 10% case is 3,047, in the EV30% case is 2,441, and in the EV 50% case is 1,835 (Figure 4.9). The trend in the number of service stations from 2015 to 2040 in the EV 50% case shows a very small decrease, and it will be almost flat from 2035 (Figure 4.10).

**Figure 4.10: Trend in Number of Service Stations, 2015–2040**



BAU = business-as-usual.

Source: Authors' calculation.

### 2.3. Decrease in Number of Employees in the Oil Industry

There are no official statistics of the number of employees in the oil industry. Therefore, the number of employees is estimated based on the information obtained from the website of oil companies in the Lao PDR.

Company P:

(1) 138 service stations in 2014 — estimated 1,380 people

(2) 5 depots and 3 terminals — estimated 140 people

(3) 300 tank-trucks — estimated 300 people

(4) Control section (10%) — estimated 180 people

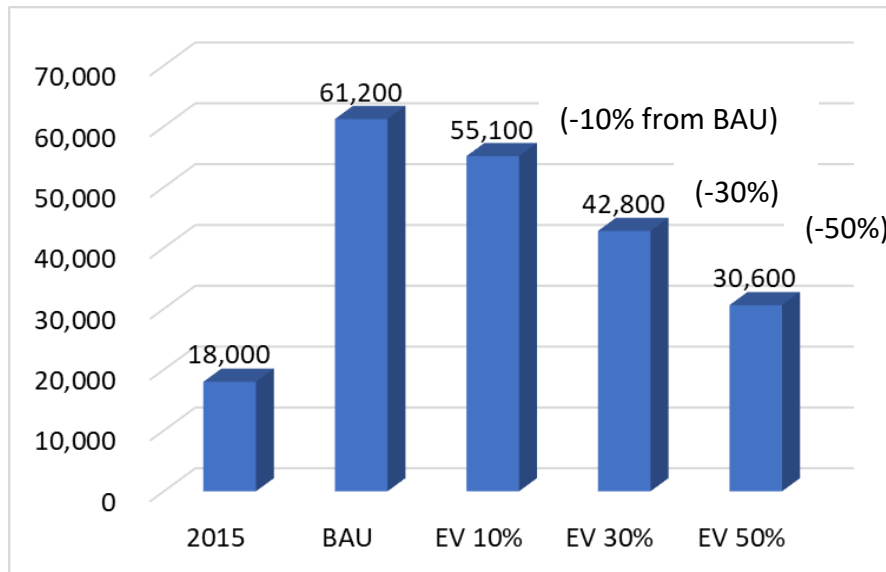
Total = 2,000 people

Company P has stated on its website that it has 2,000 employees.

Since Company P's share is about 11%, the total number of employees in the oil industry in 2015 is estimated to be 18,000.

Assuming that the number of employees in the oil industry increases in proportion to the demand for oil, the number of employees by scenario in 2040 is shown in Figure 4.11 and Figure 4.12.

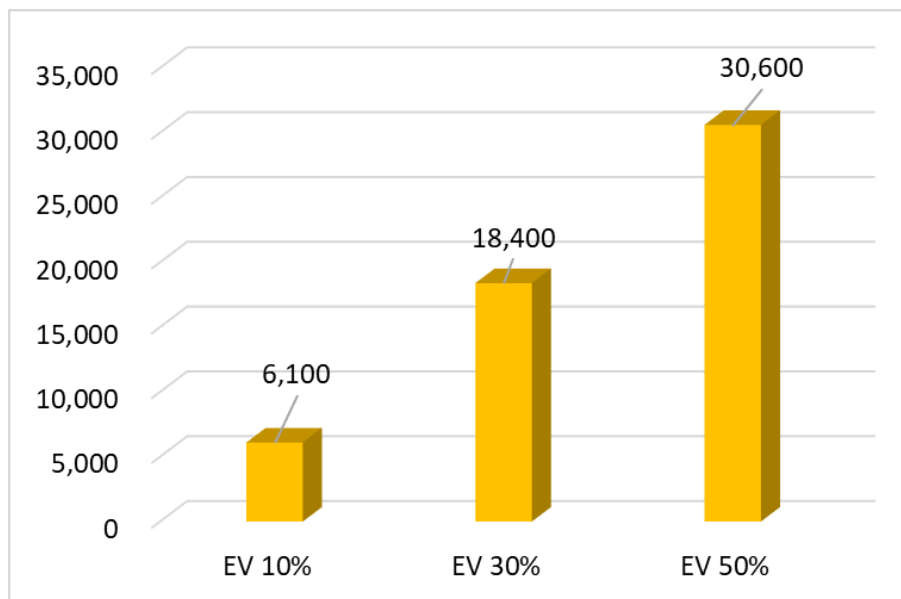
**Figure 4.11: Estimation of Number of Employees in Oil Industry**



BAU = business-as-usual.

Source: Authors' calculation.

**Figure 4.12: Decrease in Number of Employees Compared with BAU Case**



BAU = business-as-usual.

Source: Authors' calculation.

### **3. Positive and Negative Impacts**

#### **3.1. Positive Impact**

Since the demand for gasoline and diesel oil will expand 3.4 times in 2040 from 2015 in the BAU case, the import value of gasoline and diesel oil will be 3.4 times.

However, the penetration of EVs will improve the trade balance due to the decrease of import of gasoline and diesel oil. The import value of gasoline and diesel oil was 10.4 % of the total import value of the Lao PDR in 2015. Although imports and exports will increase due to economic development in 2040, it is certain that the decrease in imports of petroleum products will contribute to the improvement of the trade balance.

In addition, the decrease in oil imports has the effect of boosting gross domestic product (GDP). According to the ERIA Outlook (Kimura and Phoumin, 2021), the of GDP of the Lao PDR in 2040 is projected to be \$46 billion (2010 price). The decrease in import value by EV penetration scenario in 2040 is estimated at \$217 million in the EV 10% case, \$651 million in the EV 30% case, and \$1,085 million in the EV 50% case.

Therefore, the effect of boosting the GDP due to the decrease in import value is estimated to be 0.5% in the EV 10% case, 1.4% in the EV 30% case, and 2.4% in the EV 50% case.

Government revenues will decrease due to EV penetration scenarios. However, government revenues may be recovered by revenues such as taxes from the electricity sector.

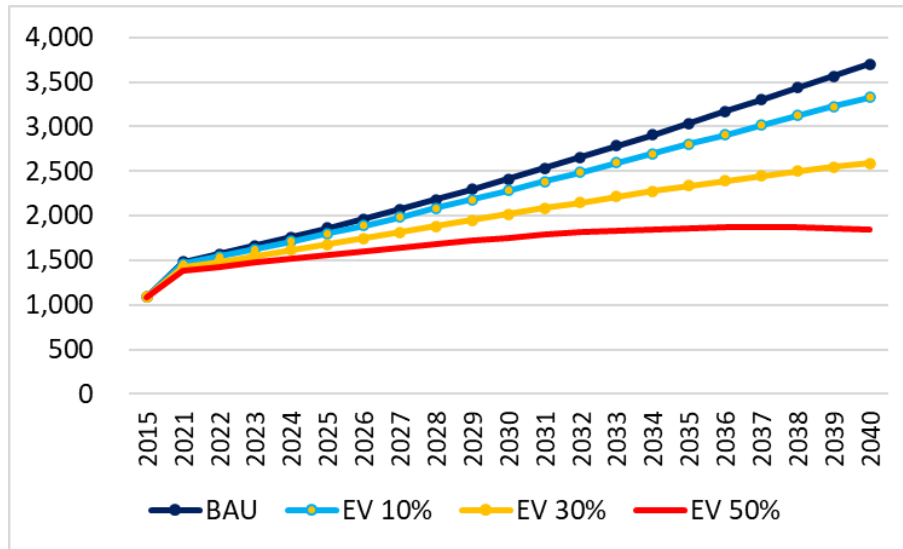
On the other hand, there is no positive impact for the oil industry. However, if the long-term outlook for EV penetration is clarified, there is a possibility of business opportunities other than oil, such as entry into EV-related businesses.

#### **3.2. Negative Impact**

Depending on the EV penetration scenario, it will have a negative impact on the oil industry. Demand for gasoline and diesel oil from 2015 to 2040 in the EV 10% case and the EV 30% case will increase by an average of 4.6% and 3.5% annually, respectively. That is not such a serious impact. However, in the EV 50% case, the annual growth rate of demand for gasoline and diesel oil will be only 2.1%, and almost flat from 2035.

There will be a negative impact on the oil industry in the EV 50% scenario.

**Figure 4.13: Demand for Gasoline and Diesel Oil in 2040 by EV Penetration Scenario**  
(1,000 kl)



AGR = annual growth rate, BAU = business-as-usual, EV = electric vehicle.

Source: Author's calculation.

In Japan's experience, oil demand will level off, and if service station sales stop growing, there will be fierce competition in a non-expanding market. This is because service station labour costs and overheads will increase due to consumer price increases, but profits will decrease because the sales amount will not increase.

Under these circumstances, it is expected that service stations that try to increase sales volume with a low-price strategy will appear and will develop into price competition nationwide. Price competition can result in lower profit and create a situation where more service stations go bankrupt.

The government may need to consider ways to avoid such a situation. Possible measures include a law prohibiting unfair bargaining and a law prohibiting radical methods of attracting customers. In addition, a system to subsidise the funds for business closure is also effective.