

Forecast of Petroleum Demand by Province in 2030 and 2040

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Chapter 5

Forecast of Petroleum Demand by Province in 2030 and 2040

It is necessary to estimate the demand for petroleum products by province in 2030 and 2040 to consider the petroleum supply plan for those years. Estimating future demand requires analysing the yearly demand for petroleum products from 2007 to 2018. Thus, the demand by province for each petroleum product in 2018 can be projected. Since no data by province is available, the base data for provincial demand in 2018 is estimated based on the survey of the delivery volume of oil companies by province, which was conducted in cooperation with the General Department of Petroleum, Ministry of Mines and Energy, Cambodia.³ This survey was initially conducted to identify the provinces with a high demand for petroleum products.

Demand for petroleum products increases along with the increase of economic activities. An analysis of the relationship between the province-by-province demand and population shows a significantly high correlation, as an increase of factories, commercial facilities, housing, and movement of people and materials is closely linked to increased economic activity. Therefore, in order to forecast the demand for petroleum products by province in 2030 and 2040, we calculated the total demand outlook for ERIA in 2030 and 2040 by multiplying it by the estimated composition ratio by province.

1 Current Petroleum Demand in Cambodia

1.1 Yearly demand for petroleum products

The total demand for petroleum products in Cambodia is increasing further, with economic growth exceeding 7% per year. The average annual growth rates of the major petroleum products over the last 5 years were 9.1% for gasoline, 7.9% for diesel oil, and 22.3% for liquefied petroleum gas (LPG). Fuel oil is decreasing due to electricity fuel conversion. Figures 5.1 to 5.4 show the changes in

³ In this project, the General Department of Petroleum/Ministry of Mines and Energy and ERIA conducted a survey on petroleum companies in 2020 regarding the current supply chain nationwide.

petroleum product imports. Cambodia depended on imports for all petroleum products, and the import volume was assumed to equal the demand volume.



kl = kilolitres.

Source: General Department of Petroleum, Ministry of Mines and Energy.

Gasoline demand in 2018 was 819,043 kl, and the growth rate in 2013–2018 was 9.1%. Diesel oil demand in 2018 was 1,638,218 kl, growing at 7.9% per year in 2013–2018. LPG demand was 270,320 tonnes in 2018, and the growth rate was the fastest over 2013–2018 at 22.3% per year. Fuel demand in 2018 was 95,528 kl, with a growth rate of –12.7% in 2013–2018.

1.2 Demand and population analysis, by province

1) Population, by province

Figure 5.5 shows the population by province, based on the 2019 national census conducted by the National Institute of Statistics (NIS), Ministry of Planning. The total population of Cambodia in 2019 was 15,288,489.

As quoted from the General Population Census of the Kingdom of Cambodia 2019, the Central Plain region was the most highly populated of the four regions, with 7,477,444 people constituting 48.9% of the total population. The Central Plain region covers Kampong Cham, Tbong Khmum, Kandal,

Phnom Penh, Prey Veng, Svay Rieng, and Takeo. Tonle Sap is the second most populated region with 4,801,260 people, or 31.4% of the total. This region covers Banteay Meanchey, Battambang, Kampong Chhnang, Kampong Thom, Pursat, Siem Reap, Oddar Meanchey, and Pailin provinces. The plateau and mountain regions covering Kampong Speu, Kratie, Mondul Kiri, Preah Vihear, Ratanak Kiri, and Stung Treng provinces were the third most populous area with 1,948,637 people or 12.7% of the total population. Finally, the coastal and sea region has 1,061,148 people, equal to 6.9%. This region covers Kampot, Koh Kong, Preah Sihanouk, and Kep provinces. Table 5.1 shows the population and composition ratio, by province, in 2018 and 2019.





Source: National Institute of Statistics (2019).

Province		2018 Population	%	2019 Population	%
1	Banteay Meanchey	841,190	5.6	859,545	5.6
2	Battambang	990,776	6.6	987,400	6.5
3	Kampong Cham	897,847	5.9	895,763	5.9
4	Kampong Chhnang	520,819	3.5	525,932	3.4
5	Kampong Speu	856,812	5.7	872,219	5.7
6	Kampong Thom	672,958	4.5	677,260	4.4
7	Kampot	592,206	3.9	592,845	3.9
8	Kandal	1,185,659	7.9	1,195,547	7.8
9	Kohkong	123,047	0.8	123,618	0.8
10	Kratie	367,600	2.4	372,825	2.4
11	Mondolkiri	85,701	0.6	88,649	0.6
12	Phnom Penh	2,062,833	13.7	2,129,371	13.9
13	Preah Vihear	242,721	1.6	251,352	1.6
14	Prey Veng	1,046,916	6.9	1,057,428	6.9
15	Pursat	410,410	2.7	411,759	2.7
16	Ratanakkiri	198,456	1.3	204,027	1.3
17	Siem Reap	995,971	6.6	1,006,512	6.6
18	Preah Sihanouk	294,379	2.0	302,887	2.0
19	Stung Treng	154,471	1.0	159,565	1.0
20	Svay Rieng	520,612	3.4	524,554	3.4
21	Takeo	894,381	5.9	899,485	5.9
22	Oddar Meanchey	253,284	1.7	261,252	1.7
23	Кер	41,209	0.3	41,798	0.3
24	Pailin	71,498	0.5	71,600	0.5
25	Tbong Khmum	773,989	5.1	775,296	5.1
	Cambodia total	15,095,745	100.0	15,288,489	100.0

 Table 5.1.
 Population and Composition Ratio, by Province (2018 and 2019)

Source: National Institute of Statistics (2019).

2) Relationship between demand distribution and population distribution

Figure 5.6 shows a strong correlation between the demand composition ratio of petroleum products and the population composition ratio. Regarding gasoline, the demand composition ratio of Phnom Penh is substantial, so it is outside the approximation line. However, Phnom Penh is close to the approximation line of the relationship between the number of petroleum service stations and the population, by province. The reason is due to the remarkably high consumption density of Phnom Penh.

Regarding diesel oil, provinces with a high demand for transportation of agricultural products have a higher demand composition ratio for diesel oil than the population composition ratio.

LPG has the same distribution map as gasoline. This is because LPG demand is high in commercial facilities and restaurants in Phnom Penh.



Figure 5.6. Distribution of Petroleum Products and Population



SS = service stations.

Source: Authors.

2. Application of Oil Company's Information and Data

The composition ratio of petroleum products by province in 2030 and 2040 are estimated using

- 1) the composition ratio by province in 2018 according to the oil company's data;
- 2) the estimated composition ratio of population by province in 2030 and 2040;
- Cambodia's total population in 2030 and 2040, estimated by the ERIA Energy Outlook
 2019–2020;
- 4) the estimated demand per capita for petroleum products by province.

2.1 Demand for petroleum products, by province

There is no data available of petroleum demand statistics by province until now. However, in this study, with the cooperation of oil companies, data of petroleum demand by province in 2018 could be derived from delivery volume to each province. Table 5.2 shows the need for petroleum products by province in 2018, broken down from the national demand using the composition ratio of delivery volume by province. Phnom Penh, where the population is concentrated and economic activity is centred, has the highest demand composition ratio. In addition, the demand of Siem Reap, Kandal, Battambang, and Banteay Meanchey was also large.

Table 5.2. Demand for Petroleum Products, by Province and Composition Ratio, 2018

Unit: kℓ, (LPG ton)

Province	Gasoline (kℓ)		Diesel (kℓ)		LPG (tonne)		Fuel oil (kℓ)	
	%	2018	%	2018	%	2018	%	2018
Banteay Meanchey	1.5	12,197	7.2	117,325	8.0	21,711	0.4	345
Battambang	3.6	29,115	11.3	185,927	6.8	18,318	0.0	0
Kampong Cham	6.0	49,535	4.8	77,874	2.4	6,463	0.6	547
Kampong Chhnang	2.1	17,310	3.1	50,873	2.9	7,715	0.0	0
Kampong Speu	1.9	15,492	2.3	37,410	1.6	4,219	0.2	190

Kampong Thom	1.5	12,144	3.9	63,795	2.2	5,880	0.0	0
Kampot	1.2	9,670	1.3	21,206	2.8	7,488	0.1	142
Kandal	9.7	79,341	5.9	96,698	5.2	14,085	4.9	4,638
Kohkong	0.3	2,176	0.4	7,158	2.4	6,356	0.0	0
Kratie	3.1	25,382	3.3	54,129	0.8	2,086	0.2	230
Mondolkiri	1.8	14,870	2.1	34,098	0.4	1,034	0.0	0
Phnom Penh	37.4	306,364	15.9	260,388	39.1	105,669	84.7	80,947
Preah Vihear	1.5	11,966	2.6	42,742	0.7	1,887	0.0	0
Prey Veng	3.7	29,991	3.6	59,737	1.9	5,112	0.0	0
Pursat	2.5	20,854	4.5	73,333	1.8	4,924	0.0	0
Ratanakkiri	3.2	26,330	1.4	22,930	0.6	1,558	0.0	0
Siem Reap	5.2	42,831	9.4	153,503	6.5	17,511	1.2	1,123
Preah Sihanouk	2.6	21,005	2.5	40,260	5.4	14,500	6.6	6,322
Stung Treng	0.9	7,251	1.7	27,431	0.6	1,517	0.0	0
Svay Rieng	2.7	22,167	2.8	46,236	3.1	8,268	1.0	930
Takeo	2.9	23,726	1.9	31,441	3.2	8,726	0.0	36
Oddar Meanchey	0.7	6,043	2.3	38,192	0.6	1,721	0.0	0
Кер	0.1	1,030	0.1	1,076	0.1	313	0.0	0
Pailin	0.2	2,016	1.3	20,532	0.0	110	0.0	0
Tbong Khmum	3.7	30,237	4.5	73,926	1.2	3,149	0.1	78
Total	100.0	819,043	100.0	1,638,218	100.0	270,320	100.0	95,528

LPG = liquefied petroleum gas; kl = kilolitres.

Source: General Department of Petroleum, Ministry of Mines of Energy.

The following figures and tables show the demand distribution of major petroleum products by province. Figure 5.7 shows the demand distribution of gasoline.



Figure 5.7. Gasoline Demand, by Province, 2018 (kl)

kl = kilolitres.

Source: Authors.

Phnom Penh had the largest demand for gasoline, with more than 37% share. The total gasoline demand of Kandal and Kampong Cham provinces was 9.7% and 6%, respectively. The shares of the remaining provinces were below 6% (Table 5.3).

Province	Demand kilolitre (kl)	Composition (%)		
Phnom Penh	306,364	37.4		
Kandal	79,341	9.7		
Kampong Cham	49,535	6.0		
Siem Reap	42,831	5.2		
Prey Veng	29,991	3.7		
Battambang	29,115	3.6		

Table 5.3. Provinces with Large Demand for Gasoline, 2018

Source: Authors.

Phnom Penh's demand for diesel oil was around 16%, and Battambang, around 11%. The demand of the remaining provinces for diesel oil will be less than 10% of total Cambodia demand (Table 5.4). Figure 5.8 shows the demand distribution of diesel oil.

Province	Demand kilolitre (kl)	Composition (%)
Phnom Penh	260,388	15.9
Battambang	185,927	11.3
Siem Reap	153,503	9.4
Banteay Meanchey	117,325	7.2
Kandal	96,698	5.9
Kampong Cham	77,874	4.8

Table 5.4. Provinces with Large	Demand for Diesel Oil, 2018
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Source: Authors.



Figure 5.8. Diesel Oil Demand, by Province, 2018 (kl)

kl = kilolitres.

Source: Authors.

Province	Demand, tonne	Composition, %
Phnom Penh	105,669	39.1
Banteay Meanchey	21,711	8.0
Battambang	18,318	6.8
Siem Reap	17,511	6.5
Preah Sihanouk	14,500	5.4
Kandal	14,085	5.2

LPG = liquefied petroleum gas.

Source: Authors.



Figure 5.9. LPG Demand, by Province, 2018 (tonne)

LPG = liquefied petroleum gas. Source: Authors.

2.2 Petroleum demand, by province, in 2030 and 2040

1) Methodology

Figure 5.10 shows the estimation methodology for forecasting petroleum demand based on the oil companies' survey. As discussed earlier, the base data were the population census data and the demand data. These were used to estimate the 2030 and 2040 population and the provinces' demand per capita using the composition ratio of the population by province.

Since this study aims to create an optimal supply plan for gasoline and diesel oil in 2030 and 2040, the demand forecast by province for 2030 and 2040 will be made for gasoline and diesel oil.



Figure 5.10. Methodology of Estimation

Source: Authors.

2) Forecast of total petroleum demand in 2040

The total demand for petroleum products in 2030 and 2040 was derived based on the ERIA outlook 2019–2020. Gasoline will be 1,662 thousand kl and 2,450 thousand kl in 2030 and 2040, respectively. Diesel oil will reach 2,918 thousand kl in 2030 and 5,349 thousand kl in 2040 (Figure 5.11).



1,000 kl



kl = kilolitres Source: ERIA Energy Outlook 2019–2020

3) Breakdown of the demand for petroleum products in 2030, 2040 by province

Since the demand for petroleum products and the population by province are strongly correlated, oil demand by province in 2030 and 2040 is broken down according to the following procedure, focusing on the population factor.

- Estimate the population by province in 2030 and 2040.
- Estimate the demand per capita in 2030 and 2040 of Cambodia's total.
- Estimate the demand per capita by province in 2030 and 2040, using the same growth rate.
- Estimate the demand for petroleum products by province in 2030 and 2040
 - > Demand per capita in 2030, 2040 × population in 2030, 2040 (by province)
 - Calculate the demand composition ratio in 2030 and 2040 by province.

 ERIA demand forecast 2030 and 2040 × demand composition ratio in 2030 and 2040 by province

The following explains in detail the procedure for estimating the petroleum demand of provinces in 2030 and 2040.

4) Population estimate, by province, in 2030 and 2040

For the total population of Cambodia in 2030 and 2040, this study adopted the ERIA Energy Outlook 2019–2020. The total population in 2030 is 19,460,617, and 22,584,840 in 2040.

Next, the population composition ratio by province 2030 and 2040 is estimated by using the last 10 years' data of the population composition ratio by province. Based on this estimated population composition ratio, the population of the provinces in 2030 and 2040 can be calculated as:

Population composition ratio by province in 2030 × Total population in 2030

Population composition ratio by province in 2040 × Total population in 2040

Although the census population data was from 1998, the last 10 years reflected the impact of recent economic developments. Table 5.6 shows the population by province in 2040.

The population concentration in Phnom Penh will further increase. The composition ratio of Phnom Penh in 2040 increases from 13.9% to 16.8%, and the annual growth rate from 2018 to 2040 is 2.4%, which is higher than the growth rate of Cambodia as a whole of 1.5%.

Composition ratio of Population by province					Population by province					
Province	2008	2018	2030	2040	2008	2018	2030	2040	2018– 40	
Banteay Meanchey	5.1	5.6	6.0	6.2	677,872	915,099	1,162,900	1,401,709	2.0%	
Battambang	7.7	6.5	5.7	5.2	1,025,174	1,051,218	1,111,007	1,178,873	0.5%	
Kampong Cham	6.9	5.9	5.2	4.8	918,956	953,658	1,017,791	1,088,441	0.6%	
Kampong Chhnang	3.5	3.4	3.4	3.3	472,341	559,924	658,344	755,618	1.4%	
Kampong Speu	5.4	5.7	5.9	6.1	716,944	928,592	1,152,977	1,370,454	1.8%	
Kampong Thom	4.7	4.4	4.2	4.1	631,409	721,033	826,658	932,534	1.2%	
Kampot	4.4	3.9	3.6	3.4	585,850	631,162	693,651	758,813	0.8%	
Kandal	8.1	7.8	7.6	7.5	1,091,170	1,272,818	1,480,613	1,687,105	1.3%	
Kohkong	0.9	0.8	0.8	0.7	117,481	131,608	148,862	166,327	1.1%	
Kratie	2.4	2.4	2.5	2.5	319,217	396,921	481,030	563,151	1.6%	
Mondolkiri	0.5	0.6	0.7	0.7	61,107	94,379	128,245	160,505	2.4%	
Phnom Penh	11.2	13.9	15.7	16.8	1,501,725	2,266,997	3,048,193	3,793,422	2.4%	
Preah Vihear	1.3	1.6	1.9	2.0	171,139	267,597	365,648	458,975	2.5%	
Prey Veng	7.1	6.9	6.8	6.7	947,372	1,125,772	1,325,764	1,523,277	1.4%	
Pursat	3.0	2.7	2.5	2.4	397,161	438,372	490,556	543,878	1.0%	
Ratanakiri	1.1	1.3	1.5	1.6	150,466	217,214	285,834	351,519	2.2%	
Siem Reap	6.7	6.6	6.5	6.5	896,443	1,071,565	1,266,790	1,459,257	1.4%	
Preah Sihanouk	1.7	2.0	2.2	2.3	221,396	322,463	426,201	525,428	2.2%	
Stung Treng	0.8	1.0	1.2	1.3	111,671	169,878	229,236	285,832	2.4%	
Svay Rieng	3.6	3.4	3.3	3.2	482,788	558,457	645,955	733,183	1.2%	
Takeo	6.3	5.9	5.6	5.4	844,906	957,621	1,092,166	1,227,515	1.1%	
Oddar Meanchey	1.4	1.7	1.9	2.0	185,819	278,137	372,488	462,548	2.3%	
Кер	0.3	0.3	0.3	0.3	35,753	44,499	53,961	63,197	1.6%	
Pailin	0.5	0.5	0.4	0.4	70,486	76,228	84,017	92,109	0.9%	
Tbong Khmum	5.7	5.1	4.7	4.4	761,036	825,405	911,729	1,001,171	0.9%	
Cambodia total	100. 0	100. 0	100. 0	100. 0	13,395,68 2	16,276,61 5	19,460,61 7	22,584,84 0	1.5%	

Table 5.6. Population, by Province

Source: Authors.

5) Estimate of the demand per capita in 2040 of Cambodia total

The demand per capita in 2030 and 2040 of Cambodia total is estimated using historical data of demand per capita from 2007 to 2018, by trend function after conversion to logarithm. Gasoline demand per capita is estimated 44.4 litre/year in 2030 and 51.3 litre/year in 2040. Diesel demand per capita is estimated 105.4 litre/year in 2030 and 129.2 litre/year in 2040.

Products	2018	2030	2040
Gasoline	37.2	44.4	51.3
Diesel Oil	82.5	105.4	129.2

Table 5.7. Demand per Capita, 2030 and 2040 (Cambodia total)

Source: Authors.

6) Estimate of the demand per capita in 2040, by province

The demand per capita by petroleum product by province in 2040 is calculated by the AAGR (Table 5.7). The start of calculation is demand per capita by petroleum product by province in 2018.

7) Demand for petroleum products, by province, in 2030 and 2040

Demand for petroleum products by province in 2030 and 2040 is calculated by multiplying the demand per capita by province with the population by province:

Demand per capita by province in 2030 × Population in 2030 by province

Demand per capita by province in 2040 × Population in 2040 by province

After this calculation, the demand composition ratio in 2030 and 2040 by province can be calculated (Table 5.8). As observed from the table, the composition ratio of Phnom Penh becomes even larger in 2040 compared to 2018.

Province		Gasoline		Diesel Oil			
FIOVINCE	2018	2030	2040	2018	2030	2040	
Banteay Meanchey	1.5	1.5	1.5	7.2	7.6	7.8	
Battambang	3.6	3.0	2.7	11.3	10.0	9.1	
Kampong Cham	6.0	5.2	4.7	4.8	4.2	3.9	
Kampong Chhnang	2.1	2.0	1.9	3.1	3.0	3.0	
Kampong Speu	1.9	1.9	1.9	2.3	2.4	2.4	
Kampong Thom	1.5	1.4	1.3	3.9	3.7	3.6	
Kampot	1.2	1.0	1.0	1.3	1.2	1.1	

Table 5.8. Demand Composition Ratio, by Province, 2040

Kandal	9.7	9.1	8.7	5.9	5.7	5.6
Kohkong	0.3	0.2	0.2	0.4	0.4	0.4
Kratie	3.1	3.0	3.0	3.3	3.3	3.3
Mondolkiri	1.8	2.0	2.1	2.1	2.3	2.5
Phnom Penh	37.4	40.5	42.4	15.9	17.7	18.9
Preah Vihear	1.5	1.6	1.7	2.6	3.0	3.2
Prey Veng	3.7	3.5	3.4	3.6	3.6	3.5
Pursat	2.5	2.3	2.1	4.5	4.2	4.0
Ratanakkiri	3.2	3.4	3.5	1.4	1.5	1.6
Siem Reap	5.2	5.0	4.8	9.4	9.2	9.1
Preah Sihanouk	2.6	2.7	2.8	2.5	2.7	2.9
Stung Treng	0.9	1.0	1.0	1.7	1.9	2.0
Svay Rieng	2.7	2.5	2.4	2.8	2.7	2.6
Takeo	2.9	2.7	2.5	1.9	1.8	1.8
Oddar Meanchey	0.7	0.8	0.8	2.3	2.6	2.8
Кер	0.1	0.1	0.1	0.1	0.1	0.1
Pailin	0.2	0.2	0.2	1.3	1.1	1.1
Tbong Khmum	3.7	3.3	3.0	4.5	4.1	3.9
Cambodia total	100.0	100.0	100.0	100.0	100.0	100.0

Source: Authors.

Based on this ratio, the demand for petroleum products, by province, in 2030 and 2040 can be calculated (Table 5.9) using the following formula:

ERIA demand forecast 2030 × Demand composition ratio in 2030 by province

ERIA demand forecast 2040 × Demand composition ratio in 2040 by province

Provinco	Gasoline (kℓ)			Diesel Oil (kl)			
Flovince	2018	2030	2040	2018	2030	2040	
Banteay Meanchey	12,197	25,349	37,359	117,325	227,995	417,902	
Battambang	29,115	50,322	74,164	185,927	264,522	484,854	
Kampong Cham	49,535	86,456	127,419	77,874	112,759	206,681	
Kampong Chhnang	17,310	33,284	49,053	50,873	87,098	159,645	
Kampong Speu	15,492	31,458	46,363	37,410	70,044	128,387	
Kampong Thom	12,144	22,769	33,557	63,795	104,675	191,864	
Kampot	9,670	17,380	25,614	21,206	32,344	59,284	
Kandal	79,341	150,935	222,449	96,698	162,607	298,050	
Kohkong	2,176	4,026	5,933	7,158	11,477	21,038	
Kratie	25,382	50,306	74,141	54,129	97,430	178,584	
Mondolkiri	14,870	33,045	48,702	34,098	73,567	134,845	
Phnom Penh	306,364	673,668	992,854	260,388	552,771	########	
Preah Vihear	11,966	26,740	39,409	42,742	93,005	170,474	
Prey Veng	29,991	57,760	85,126	59,737	102,545	187,960	
Pursat	20,854	38,164	56,246	73,333	115,426	211,570	
Ratanakiri	26,330	56,662	83,508	22,930	47,077	86,289	
Siem Reap	42,831	82,806	122,040	153,503	265,201	486,099	
Preah Sihanouk	21,005	45,401	66,912	40,260	83,224	152,545	
Stung Treng	7,251	16,002	23,583	27,431	58,554	107,326	
Svay Rieng	22,167	41,931	61,798	46,236	77,009	141,154	
Takeo	23,726	44,252	65,219	31,441	51,129	93,717	
Oddar Meanchey	6,043	13,235	19,506	38,192	80,578	147,696	
Кер	1,030	2,042	3,009	1,076	1,938	3,552	
Pailin	2,016	3,634	5,356	20,532	31,474	57,691	
Tbong Khmum	30,237	54,621	80,500	73,926	113,759	208,514	
Cambodia total	819,043	1,662,245	2,449,820	1,638,218	2,918,210	5,348,920	

Table 5.9. Demand for Petroleum Products, by Province, 2040

kl = kilolitres.

Source: Authors.

Tables 5.10 to 5.12 show the provinces with large demand.

Province	Demand, kl	Composition, %
Phnom Penh	992,854	42.4
Kandal	222,449	8.7
Siem Reap	122,040	4.8
Kampong Cham	127,419	4.7
Ratanakkiri	83,508	3.5
Prey Veng	85126	3.4

Table 5.10. Provinces with Large Demand for Gasoline, 2040

kl = kilolitres.

Source: Authors.

Table 5.11. Provinces with Large Demand for Diesel Oil, 2040

Province	Demand, kl	Composition, %
Phnom Penh	1,013,199	18.9
Siem Reap	486,099	9.1
Battambang	484,854	9.1
Banteay Meanchey	417,902	7.8
Kandal	298,050	5.6
Pursat	211,570	4.0

kl = kilolitres.

Source: Authors.

Drovinco	Gaso	line+Diesel Oi	Gasoline+Diesel Oil (%)		
Province	2018	2030	2040	%	2018–40
Banteay Meanchey	129,522	253,343	455,261	5.8	5.9
Battambang	215,042	314,843	559,018	7.2	4.4
Kampong Cham	127,409	199,215	334,100	4.3	4.5
Kampong Chhnang	68,183	120,381	208,699	2.7	5.2
Kampong Speu	52,902	101,502	174,750	2.2	5.6
Kampong Thom	75,939	127,445	225,422	2.9	5.1
Kampot	30,875	49,723	84,898	1.1	4.7
Kandal	176,039	313,542	520 <i>,</i> 499	6.7	5.1
Kohkong	9 <i>,</i> 335	15,503	26,971	0.3	4.9
Kratie	79,511	147,736	252,724	3.2	5.4
Mondolkiri	48,968	106,612	183,546	2.4	6.2
Phnom Penh	566,751	1,226,439	2,006,053	25.7	5.9
Preah Vihear	54,709	119,745	209,883	2.7	6.3
Prey Veng	89,728	160,305	273,086	3.5	5.2
Pursat	94,187	153,590	267,816	3.4	4.9
Ratanakkiri	49,260	103,739	169,798	2.2	5.8
Siem Reap	196,334	348,007	608,139	7.8	5.3
Preah Sihanouk	61,264	128,625	219,457	2.8	6.0
Stung Treng	34,682	74,555	130,909	1.7	6.2
Svay Rieng	68,403	118,940	202,952	2.6	5.1
Takeo	55,167	95,382	158,936	2.0	4.9
Oddar Meanchey	44,235	93,814	167,202	2.1	6.2
Кер	2,105	3,980	6,561	0.1	5.3
Pailin	22,548	35,108	63 <i>,</i> 047	0.8	4.8
Tbong Khmum	104,164	168,380	289,014	3.7	4.7
Cambodia total	2,457,262	4,580,455	7,798,740	100.0	5.4

Table 5.12. Total Demand for Gasoline and Diesel Oil in 2030 and 2040

kl = kilolitres.

Source: Authors.

Table 5.12 shows that the total demand for gasoline and diesel oil in 2040 will increase more than three times from 2018. Therefore, it is necessary to prepare more than thrice the supply capacity. The provinces with the largest increase in demand will be around the Phnom Penh and the west areas. The total demand of these two areas accounts for about 80% of the total national demand.

These areas, however, are far from Sihanoukville, the main supply site. Thus, this condition will become significant in considering the future supply plan.

3. Application of Results from the Energy Consumption Survey

This chapter presents the petroleum demand forecast by province in 2040 based on the result of the energy consumption survey to compare to the forecasted results mentioned in section 5.2. The first step is to estimate the total oil consumption of the final sector in 2018, by province, using the survey result and adjusted to the national level consumption of the Energy Balance Table (EBT) 2018. Next, the demand in 2040 is projected based on the growth of socio-economic activities. Since activities data is limited, the future demand forecast of oil products, by province, was adjusted. The consumption survey covers (i) gasoline consumed by the transport sector; (ii) diesel oil consumed by the industry, transport, and commercial sectors; and (iii) LPG consumed by the transport, commercial, and residential sectors.

3.1. Sectoral petroleum consumption, by province, 2018

1) Transport sector

Gasoline-based vehicles surveyed accounted for around 71% to 82% of the total vehicles sampled (see Chapter 3). The parking lot survey revealed each vehicle's fuel economy and distance travelled in the surveyed provinces. The average fuel consumption (gasoline, diesel, and LPG) per vehicle per year was estimated. Multiplied this with the number of vehicles will result in total fuel consumption of the sector.

The number of vehicles by type in each province is not available. In this case, the number of vehicles by province in 2018 was estimated based on the number of vehicles nationwide and the province's share of the national urban population. The provincial share of the urban population was based on the 2019 population census of Cambodia. This share was assumed to be the same for 2018 (Table 5.13). Because the number of vehicles is concentrated in urban areas, the urban population was selected for this estimation.

	Province	Urban Populatio	
	Province	Person	Share (%)
1	Banteay Meanchey	327,653	5.5
2	Battambang	209,921	3.5
3	Kampong Cham	133,371	2.2
4	Kampong Chhnang	125,768	2.1
5	Kampong Speu	538,780	9.0
6	Kampong Thom	73,069	1.2
7	Kampot	61,693	1.0
8	Kandal	797,833	13.4
9	Kohkong	58,871	1.0
10	Kratie	42,221	0.7
11	Mondolkiri	34,075	0.6
12	Phnom Penh	2,129,371	35.6
13	Preah Vihear	25,491	0.4
14	Prey Veng	63,351	1.1
15	Pursat	75,259	1.3
16	Ratanakkiri	31,810	0.5
17	Siem Reap	318,469	5.3
18	Preah Sihanouk	167,584	2.8
19	Stung Treng	46,126	0.8
20	Svay Rieng	161,473	2.7
21	Takeo	296,325	5.0
22	Oddar Meanchey	93,551	1.6
23	Кер	34,438	0.6
24	Pailin	57,140	1.0
25	Tbong Khmum	69,808	1.2
	Cambodia total	5,973,451	100.0

Table 5.13. Assumed Urban Population in 2018

Source: Author's calculation.

The number of vehicles nationwide also needed to be estimated because the statistics only covered vehicles by type (sedan, truck, bus, and motorcycle), not by the fuel they consumed. Since the survey provided the average consumption of gasoline, diesel, and LPG per vehicle and the EBT 2018 has data on each fuel consumption for road transport, the number of vehicles for each fuel was estimated.

Table 5.14 shows the estimated number of vehicles by fuel and province and the resulting fuel consumption.

	Province	e Number of Vehicles (Units)		Co	onsumption		
		Gasoline	Diesel	LPG	Gasoline (Kl)	Diesel	LPG
						(KI)	(tonne)
1	Banteay Meanchey	80,980	5,181	1,958	46,037	70,355	6,355
2	Battambang	51,882	3,320	1,255	23,044	45,075	4,072
3	Kampong Cham	32,963	2,109	797	16,308	4,032	514
4	Kampong Chhnang	31,084	1,989	752	17,671	21,273	1,989
5	Kampong Speu	133,160	8,520	3,220	75,702	63,509	4,597
6	Kampong Thom	18,059	1,155	437	10,267	8,613	623
7	Kampot	15,248	976	369	8,668	7,272	526
8	Kandal	197,185	12,616	4,769	94,077	171,315	15,476
9	Kohkong	14,550	931	352	9,027	6,939	502
10	Kratie	10,435	668	252	6,474	4,977	360
11	Mondolkiri	8,422	539	204	5,225	10,588	817
12	Phnom Penh	526,276	33,672	12,727	292,984	300,176	18,657
13	Preah Vihear	6,300	403	152	3,909	7,921	611
14	Prey Veng	15,657	1,002	379	7,470	7,468	541
15	Pursat	18,600	1,190	450	11,540	23,386	1,804
16	Ratanakkiri	7,862	503	190	4,878	9,885	763
17	Siem Reap	78,710	5,036	1,904	37,553	82,593	6,989
18	Preah Sihanouk	41,418	2,650	1,002	25,697	52,074	4,018
19	Stung Treng	11,400	729	276	7,073	14,333	1,106
20	Svay Rieng	39,908	2,553	965	24,760	50,175	3,871
21	Takeo	73,237	4,686	1,771	45,438	92,078	7,104
22	Oddar Meanchey	23,121	1,479	559	14,345	29,069	2,243
23	Кер	8,511	545	206	5,281	10,701	826
24	Pailin	14,122	904	342	8,762	17,755	1,370
25	Tbong Khmum	17,253	1,104	417	10,704	21,692	1,674
	Cambodia total	1,476,344	94,459	35,704	812,896	1,133,255	87,409

Table 5.14. Number of Vehicles and Consumption of Petroleum, 2018

kl = kilolitres; LPG = liquefied petroleum gas. Source: Author's calculation.

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1) Industry sector

As discussed in Chapter 3, the industry survey was grouped into three types of industries: food and beverages, garments, and others. The petroleum consumed by the industries surveyed was only diesel. LPG consumption recorded during the survey was excluded since it is usually used for non-manufacturing processes, such as heating water for drinking, etc.

The survey result provided the average diesel consumption (litre/'000 US\$/year). This was revised to average diesel consumption per factory (litre/factory/year) since the available data was on the number of factories by type by province. The General Department of Petroleum of the MME provided the data from the Ministry of Industry, Science, Technology, and Innovation. Industrial establishments totalled 1,844, and the distribution by type and province is shown in Table 5.15.

	Province	Garment	Food &	Others	Total
			Beverages		
1	Banteay Meanchey	5	2	13	20
2	Battambang	0	8	8	16
3	Kampong Cham	6	2	15	23
4	Kampong Chhnang	12	4	11	27
5	Kampong Speu	70	14	129	213
6	Kampong Thom	0	4	7	11
7	Kampot	1	5	14	20
8	Kandal	114	13	145	272
9	Kohkong	1	1	5	7
10	Kratie	0	2	9	11
11	Mondolkiri	0	0	2	2
12	Phnom Penh	407	37	333	777
13	Preah Vihear	0	2	3	5
14	Prey Veng	0	2	3	5
15	Pursat	3	3	2	8
16	Ratanakkiri	0	2	4	6
17	Siem Reap	1	4	1	6
18	Preah Sihanouk	15	19	170	204
19	Stung Treng	0	0	1	1
20	Svay Rieng	23	1	101	125
21	Takeo	28	4	39	71
22	Oddar Meanchey	0	1	1	2

Table 5.15. Distribution of Industrial Establishments, by Type and Province, 2018

Province		Garment	Food &	Others	Total
			Beverages		
23	Кер	0	0	0	0
24	Pailin	0	1	0	1
25	Tbong Khmum	0	1	10	11
	Cambodia total	686	132	1,026	1,844

Source: Authors calculation.

Table 5.16 shows the diesel consumption of the provinces by type, with total consumption adjusted to be in line with the Cambodia EBT 2018 (around 136 ktoe or 161,887 kl). The garment factories consumed 41,522 kl (26%), while food and beverages and others consumed 9,978 kl (6%) and 110,387 kl (68%), respectively.

The garment factories mainly consumed electricity, and most of them were in Phnom Penh City. Thus, the diesel consumption will mainly be for backup power since these factories are connected to the grid (purchase electricity from Electricite du Cambodge).

For the 'other' industries, Kampot province included four cement plants. The Kampot Cement Company alone consumed almost 2,000 tonnes/year, approximately 2,400 kl/year (Samrith, 2019).

		Diesel Consumption (KI)				Provincial Share (%)			
	Province	Garme nt	Food & Beverag es	Others	Total	Garme nt	Food & Beverag es	Other s	Tota I
1	Banteay Meanchey	372	52	1,278	1,702	0.9	0.5	1.2	1.1
2	Battambang	-	94	1,280	1,374	0	0.9	1.2	0.8
3	Kampong Cham	760	12	4,004	4,776	1.8	0.1	3.6	2.9
4	Kampong Chhnang	893	104	1,081	2,078	2.1	1	1	1.3
5	Kampong Speu	3,853	92	29,289	33,234	9.3	0.9	26.5	20.5
6	Kampong Thom	-	104	688	792	0	1	0.6	0.5
7	Kampot	74	130	10,427	10,632	0.2	1.3	9.4	6.6
8	Kandal	8,480	338	14,255	23,073	20.4	3.4	12.9	14.3
9	Koh Kong	74	26	492	592	0.2	0.3	0.4	0.4
10	Kratie	-	52	885	937	0	0.5	0.8	0.6
11	Mondul Kiri	-	-	197	197	0	0	0.2	0.1
12	Phnom Penh	19,209	239	19,818	39,267	46.3	2.4	18	24.3
13	Preah Vihear	-	52	295	347	0	0.5	0.3	0.2
14	Prey Veng	-	52	295	347	0	0.5	0.3	0.2
15	Pursat	223	78	197	498	0.5	0.8	0.2	0.3
16	Ratanak Kiri	-	52	393	445	0	0.5	0.4	0.3
17	Siem Reap	74	83	9	166	0.2	0.8	0	0.1
18	Preah Sihanouk/ Sihanoukville	3,715	8,209	10,562	22,486	8.9	82.3	9.6	13.9
19	Stung Treng	-	-	98	98	0	0	0.1	0.1
20	Svay Rieng	1,711	26	9,929	11,666	4.1	0.3	9	7.2
21	Takeo	2,083	104	3,834	6,021	5	1	3.5	3.7
22	Oddar Meanchey	-	26	98	124	0	0.3	0.1	0.1
23	Кер	-	-	-	-	0	0	0	0
24	Pailin	-	26	-	26	0	0.3	0	0
25	Tbong Khmum	-	26	983	1,009	0	0.3	0.9	0.6
	Total	41,522	9,978	110,38 7	161,88 7	100	100	100	100
	%	26	6	68	100				

Table 5.16. Diesel Consumption in 2018 and Share by Province

kl = kilolitres.

Source: Author's calculation.

2) Residential and commercial sectors

LPG is the only petroleum product consumed by the surveyed households in the selected provinces. The survey revealed the average LPG consumption per person (Chapter 3). The total LPG consumption of households in the province was estimated based on the provincial urban population.

This urban population composition of the province was also the basis for calculating the average petroleum consumption (LPG and diesel) of the commercial sector. The average fuel consumption of the commercial sector based on the survey was in kg/m2/year for LPG and lt.km2/year for diesel (Chapter 3). Since no data is available on the number of buildings and floor area by building type per province, the distribution of total consumption is assumed to follow the urban population ratio.

The total petroleum consumption of LPG in the EBT 2018 was almost 25 ktoe (21,201 tonnes) for the residential sector and 191 ktoe (162,209 tonnes) for the commercial sector. The diesel consumption of the commercial sector for 2018 was 220 ktoe (262,117 kl). Table 5.17 shows the 2018 petroleum consumption of the residential and commercial sectors.

Province		LPG Consump	tion (tonne)	Diesel Consumption (kl)
		Residential	Commercial	Commercial
1	Banteay Meanchey	1,163	8,897	14,378
2	Battambang	416	5,700	9,211
3	Kampong Cham	360	3,622	5,852
4	Kampong Chhnang	446	3,415	5,519
5	Kampong Speu	1,746	14,631	23,642
6	Kampong Thom	259	1,984	3,206
7	Kampot	219	1,675	2,707
8	Kandal	2,832	21,665	35,009
9	Kohkong	209	1,599	2,583
10	Kratie	150	1,147	1,853
11	Mondolkiri	121	925	1,495
12	Phnom Penh	8,434	57,823	93,437
13	Preah Vihear	90	692	1,119
14	Prey Veng	225	1,720	2,780
15	Pursat	267	2,044	3,302
16	Ratanakkiri	113	864	1,396
17	Siem Reap	975	8,648	13,975
18	Preah Sihanouk	483	4,551	7,354
19	Stung Treng	164	1,253	2,024
20	Svay Rieng	573	4,385	7,086
21	Takeo	1,052	8,047	13,003
22	Oddar Meanchey	332	2,540	4,105
23	Кер	122	935	1,511

Table 5.17. Consumption of Petroleum of the Residential and Commercial Sectors, 2018

Province		LPG Consump	tion (tonne)	Diesel Consumption (kl)	
		Residential	Commercial	Commercial	
24	Pailin	203	1,552	2,507	
25	Tbong Khmum	248	1,896	3,063	
	Cambodia total	21,201	162,209	262,117	

LPG = liquefied petroleum gas; kl = kilolitres.

Source: Author's calculation.

3.2. Petroleum demand 2040

1) Total sectoral demand

Cambodia's sectoral demand for petroleum products in 2040 followed ERIA's energy outlook and energy saving potential 2020 (Kimura and Han, 2021). The unit is in thousand tonnes of oil equivalent (ktoe) and has been converted to the original unit based on the calorific value and fuel density of the fuel. Table 5.18 shows the sectoral petroleum demand of Cambodia in 2040.

Sector	Gasoline (kl)	Diesel (kl)	LPG (tonne)
Industry		521,147	
Road	2,449,820	4,553,775	173,258
Residential			120,675
Commercial		273,998	327,422
Total	2,449,820	5,348,920	621,355

Table 5.18. Sectoral Petroleum Demand of Cambodia, 2040

kl = kilolitres; LPG = liquefied petroleum gas.

Source: Authors calculation.

2) Urban population 2040

Application of the oil companies' information and data (section 5.2) forecasted the total population of Cambodia for 2040 by adopting the United Nations' medium-range forecast (Table 5.6). Based on this, the population composition ratio by province in 2040 was also estimated.

The petroleum consumption survey used the urban population composition ratio as the basis for calculating provincial petroleum demand. In 2018, Cambodia's urban population was 39% of the total population. This study assumes that this share will increase to 45% by 2040 (8,637,318 persons). Using this assumption and the 2040 projected provincial total population from the oil companies survey, the 2040 urban population of the provinces was calculated. This estimate provides the urban population composition ratio to be used in projecting the 2040 petroleum demand (Table 5.19).

Province		Urban Population 2018		Urban Population 2040	
		Person	Share (%)	Person	Share (%)
1	Banteay Meanchey	327,653	5.5	515,910	6.0
2	Battambang	209,921	3.5	241,992	2.8
3	Kampong Cham	133,371	2.2	156,474	1.8
4	Kampong Chhnang	125,768	2.1	174,467	2.0
5	Kampong Speu	538,780	9.0	817,375	9.5
6	Kampong Thom	73,069	1.2	97,143	1.1
7	Kampot	61,693	1.0	76,243	0.9
8	Kandal	797,833	13.4	1,087,072	12.6
9	Kohkong	58,871	1.0	76,481	0.9
10	Kratie	42,221	0.7	61,578	0.7
11	Mondolkiri	34,075	0.6	59,569	0.7
12	Phnom Penh	2,129,371	35.6	3,208,182	37.1
13	Preah Vihear	25,491	0.4	44,943	0.5
14	Prey Veng	63,351	1.1	88,115	1.0
15	Pursat	75,259	1.3	95,982	1.1
16	Ratanakkiri	31,810	0.5	52,918	0.6
17	Siem Reap	318,469	5.3	445,811	5.2
18	Preah Sihanouk	167,584	2.8	280,695	3.2
19	Stung Treng	46,126	0.8	79,778	0.9

Table 5.19. Projected Urban Population in 2018 and 2040 and Composition, by Province

20	Svay Rieng	161,473	2.7	217,918	2.5
21	Takeo	296,325	5.0	390,455	4.5
22	Oddar Meanchey	93,551	1.6	159,925	1.9
23	Кер	34,438	0.6	50,275	0.6
24	Pailin	57,140	1.0	70,975	0.8
25	Tbong Khmum	69,808	1.2	87,040	1.0
	Cambodia total	5,973,451	100.0	8,637,318	100.0

Source: Author's calculation.

3) Provincial petroleum demand 2040

The sectoral petroleum demand of Cambodia and the urban population composition ratio were the bases in forecasting the 2040 petroleum demand at the provincial level. For road sector demand, the number of vehicles for the different fuels was calculated by assuming that the average fuel consumption of the different vehicle types is the same as in 2018. Table 5.20 shows the projected petroleum demand for the road sector.

Table 5.20. Petrole	eum Demand of t	the Road Tra	ansport Sector, 2040
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Province		Consumption			
		Gasoline (Kl)	Diesel (Kl)	LPG (tonne)	
1	Banteay Meanchey	138,742.34	281,467.97	12,597.53	
2	Battambang	69,448.15	180,331.33	8,071.01	
3	Kampong Cham	49,146.13	16,129.09	1,019.74	
4	Kampong Chhnang	53,255.72	85,105.51	3,942.91	
5	Kampong Speu	228,142.90	254,078.71	9,112.16	
6	Kampong Thom	30,940.59	34,457.98	1,235.79	
7	Kampot	26,123.61	29,093.40	1,043.39	
8	Kandal	283,520.26	685,373.58	30,674.95	
9	Kohkong	27,205.48	27,762.49	995.66	
10	Kratie	19,511.31	19,910.79	714.07	
11	Mondolkiri	15,746.67	42,360.01	1,619.26	
12	Phnom Penh	882,965.08	1,200,903.80	36,981.92	

13	Preah Vihear	11,779.90	31,689.03	1,211.35
14	Prey Veng	22,512.53	29,875.07	1,071.43
15	Pursat	34,778.75	93,558.09	3,576.36
16	Ratanakkiri	14,700.21	39,544.95	1,511.65
17	Siem Reap	113,172.12	330,428.11	13,853.59
18	Preah Sihanouk	77,443.65	208,330.67	7,963.68
19	Stung Treng	21,315.53	57,340.76	2,191.92
20	Svay Rieng	74,620.06	200,734.93	7,673.32
21	Takeo	136,937.47	368,374.59	14,081.54
22	Oddar Meanchey	43,231.65	116,297.19	4,445.59
23	Кер	15,914.47	42,811.41	1,636.51
24	Pailin	26,405.64	71,033.65	2,715.34
25	Tbong Khmum	32,259.81	86,781.90	3,317.34
	Cambodia total	2,449,820	4,533,775	173,258

kl = kilolitres; LPG = liquefied petroleum gas.

Source: Author's calculation.

For the residential and commercial sectors, the average LPG consumption per person for 2040 was assumed to be the same as in 2018. As a result, the 2040 LPG consumption of these sectors was calculated and adjusted to the 2040 EBT of Cambodia, as discussed above. Similarly, the 2040 diesel consumption for the commercial sector was also calculated. Table 5.21 shows the projected petroleum demand in 2040 for the residential and commercial sectors.

	Province	LPG Consumption (tonne)		Diesel Consumption
		Residential	Commercial	Commercial (KI)
1	Banteay Meanchey	7,208	19,557	16,366
2	Battambang	1,871	9,173	7,677
3	Kampong Cham	1,650	5,932	4,964
4	Kampong Chhnang	2,438	6,614	5,535
5	Kampong Speu	10,342	30,985	25,929
6	Kampong Thom	1,357	3,682	3,082
7	Kampot	1,065	2,890	2,419
8	Kandal	15,188	41,209	34,484
9	Kohkong	1,069	2,899	2,426
10	Kratie	860	2,334	1,954
11	Mondolkiri	832	2,258	1,890
12	Phnom Penh	49,613	121,615	101,772
13	Preah Vihear	628	1,704	1,426
14	Prey Veng	1,231	3,340	2,795
15	Pursat	1,341	3,638	3,045
16	Ratanakkiri	739	2,006	1,679
17	Siem Reap	5,327	16,900	14,142
18	Preah Sihanouk	3,157	10,641	8,904
19	Stung Treng	1,115	3,024	2,531
20	Svay Rieng	3,045	8,261	6,913
21	Takeo	5,455	14,801	12,386
22	Oddar Meanchey	2,234	6,062	5,073
23	Кер	702	1,906	1,595
24	Pailin	992	2,690	2,252
25	Tbong Khmum	1,216	3,299	2,761
	Cambodia total	120,675	327,422	273,998

Table 5.21. Petroleum Demand of the Residential and Commercial Sectors, 2040

LPG = liquefied petroleum gas; kl = kilolitres.

Source: Author's calculation.

The provincial petroleum demand of the industry sector in 2040 was projected using the same decomposition ratio of industrial establishments by type as in 2018 (Table 5.22).

Province		Diesel Consumption (KI)			
		Garment	Food & Beverages	Others	Total
1	Banteay Meanchey	1,197	168	4,114	5,479
2	Battambang	-	302	4,121	4,423
3	Kampong Cham	2,445	38	12,890	15,374
4	Kampong Chhnang	2,874	335	3,481	6,690
5	Kampong Speu	12,403	298	94,286	106,987
6	Kampong Thom	-	335	2,215	2,551
7	Kampot	239	419	33,567	34,225
8	Kandal	27,299	1,089	45,890	74,278
9	Kohkong	239	84	1,582	1,906
10	Kratie	-	168	2,848	3,016
11	Mondolkiri	-	-	633	633
12	Phnom Penh	61,839	770	63,798	126,407
13	Preah Vihear	-	168	949	1,117
14	Prey Veng	-	168	949	1,117
15	Pursat	718	251	633	1,603
16	Ratanakkiri	-	168	1,266	1,434
17	Siem Reap	239	266	28	533
18	Preah Sihanouk	11,960	26,426	34,000	72,387
19	Stung Treng	-	-	316	316
20	Svay Rieng	5,508	84	31,965	37,556
21	Takeo	6,705	335	12,343	19,383
22	Oddar Meanchey	-	84	316	400
23	Кер	-	-	-	-
24	Pailin	-	84	-	84
25	Tbong Khmum	-	84	3,165	3,249
	Cambodia total	133,667	32,122	355,358	521,147

Table 5.22. Industrial Diesel Demand in 2040, by Province

kl = kilolitres.

Source: Author's calculation.

4) Overall petroleum demand, by province, in 2040

The previous sections discussed the sectoral petroleum demand for 2040. This section compiled the sectoral demand by fuel type (gasoline, diesel, and LPG). Overall, Phnom Penh dominates the total demand for all types of fuels. The share will be 36% for gasoline, 27% for diesel, and 33% for LPG (Table 5.23).

The second-largest share is Kandal province at 12% for gasoline, 14% for diesel, and 14% for LPG. Combining these two provinces will make the gasoline share 48%, diesel around 40%, and LPG almost 48%. These provinces are in the central plain areas. Thus, including the other provinces in the area, gasoline share accounts for 60% of the total demand of Cambodia. Diesel accounts for 55%, and LPG is around 60%.

Province		Petroleum Demand 2040		
		Gasoline (kl)	Diesel (kl)	LPG (tonne)
1	Banteay Meanchey	138,742	303,313	39,363
2	Battambang	69,448	192,432	19,115
3	Kampong Cham	49,146	36,467	8,602
4	Kampong Chhnang	53,256	97,331	12,995
5	Kampong Speu	228,143	386,995	50,439
6	Kampong Thom	30,941	40,090	6,275
7	Kampot	26,124	65,737	4,998
8	Kandal	283,520	794,136	87,072
9	Kohkong	27,205	32,094	4,964
10	Kratie	19,511	24,880	3,908
11	Mondolkiri	15,747	44,883	4,709
12	Phnom Penh	882,965	1,429,083	208,210
13	Preah Vihear	11,780	34,232	3,543
14	Prey Veng	22,513	33,787	5,642
15	Pursat	34,779	98,206	8,555
16	Ratanakkiri	14,700	42,657	4,257
17	Siem Reap	113,172	345,103	36,081

Table 5.23. Petroleum Demand in 2040, by Fuel and by Province

18	Preah Sihanouk	77,444	289,621	21,762
19	Stung Treng	21,316	60,188	6,331
20	Svay Rieng	74,620	245,204	18,979
21	Takeo	136,937	400,144	34,338
22	Oddar Meanchey	43,232	121,770	12,742
23	Кер	15,914	44,407	4,245
24	Pailin	26,406	73,369	6,397
25	Tbong Khmum	32,260	92,791	7,832
	Cambodia total	2,449,820	5,328,920	621,355

kl = kilolitres; LPG = liquefied petroleum gas.

Source: Author's calculation.

4. Selection of Petroleum Demand, by Province, in 2040

As described earlier, two methods were applied to forecast Cambodia's petroleum demand by province in 2040. One is the application of oil companies' data, and the other is the use of the energy consumption survey results from selected provinces. The first method refers to the oil companies' delivery information of petroleum products to provinces, but the coverage is not 100%. The survey results indicated a useful unit consumption of petroleum products such as fuel economy (kl/km) and kl/floor area. However, the macroeconomic data at the provincial level were not well prepared so far; thus, we depended on the urban population for this forecast. As mentioned, the forecast results of the two methods are different. For gasoline and LPG, Phnom Penh's share using the former method is much higher than the latter (43%–36% of gasoline, and 45%–34% of LPG). For diesel oil, the latter is higher than the former, 26% and 19%, respectively. Thus, the former method results look better than the latter method, so that this time we respected the oil companies' information, even though the petroleum data was limited at the provincial level, and applied the former forecast results of petroleum demand in 2040 to seek optimal petroleum supply chains up to 2040 in Cambodia.

References

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