

Chapter 2

Energy Balance Table

The energy balance table (EBT) presents the supply-to-demand flow of all energy products – from production, importation, exportation, transformation, and consumption – within the national territory. It is widely used in estimating total energy supply, forecasting, and the study of substitution and conservation.

This chapter introduces the EBT of the Lao PDR. It also explains the estimation method for the missing data. Finally, it presents the country's EBT from 2000 to 2015.

Basic Concept of the Energy Balance Table

EBT is an accounting framework for the compilation and reconciliation of data on all energy products, from supply to demand, within the national territory of a given country during a reference period (usually a year). It expresses all forms of energy in a common accounting unit and shows the relationship between the inputs to and outputs from the energy transformation processes. It should be as complete as possible so that all of the energy flows are accounted for (United Nations, 2015).

The energy balance is a matrix showing the relationship between energy products (represented in columns) and energy flows (represented in rows). A column refers to a group of energy products in its primary or secondary form. Each cell in this column shows a flow of energy involving this group of products, as defined by the row name.

One of the main purposes of energy balance is to reflect the relationships between the primary production of energy (and other energy flows such as imports and exports in the national territory), its transformation, and final consumption. Therefore, the energy balance contains three main blocks of rows as follows:

1. Upper sector (Primary Energy Supply) – This sector intends to show flows representing indigenous energy production, imports, and exports in the national territory, as well as stock changes to provide information on the amount of energy available in the national territory during the reference period. The supply flows consist of production of primary energy products and imports of both primary and secondary energy products. The flows removing energy from the national territory are exports of primary and secondary energy products and international bunkers. The aggregate of the balance, which is the total energy supply, is computed as:¹

Total Primary Energy Supply

$$= \text{Indigenous Production} + \text{Imports} + \text{Exports} + \text{International Marine Bunkers} \\ + \text{International Aviation Bunkers} + \text{Stock Changes}$$

2. Middle sector (Energy Transfer and Transformation) – This sector intends to show flows of how energy is transformed, transferred, used by energy industries for their own use, and losses in distribution and transmission. Power generation and petroleum refinery processes are major activities in this sector.

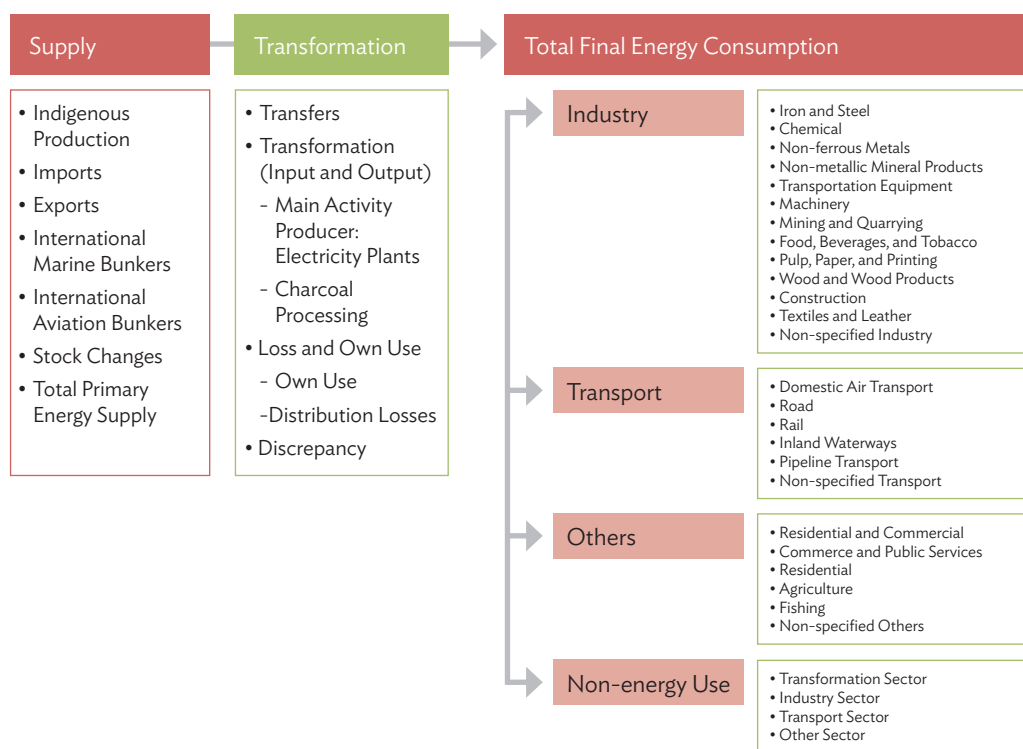
3. Lower sector (Final Energy Consumption) – This sector intends to show flows of how energy is being consumed by the final users. The flows reflect the final energy consumption and non-energy use of energy products. Thus, it excludes deliveries of fuel and other energy products for use in transformation processes and use of energy products for the energy needs of the energy industries (both covered in the middle block). Final energy consumers are grouped into three main categories:

- (i) Manufacturing, construction, and non-fuel mining industries;
- (ii) Transport; and
- (iii) Others (agriculture, forestry and fishing, commerce and public services, households, and other consumers).

Figure 2.1 is a simplified diagram of the energy flow in an EBT.

¹ Because of the sign convention in energy balances, where quantities that contribute to the supply receive positive signs while those that are removed receive negative signs, these parts can be straightly added

Figure 2.1. Energy Flow in the Energy Balance



Source: IEA and IEEJ (2018), 'International Standard of Energy Demand and Supply',

A separate row is reserved for the statistical difference, which is defined as the difference between the total supply of energy products and its total use. The statistical difference occurs because of the discrepancy arising from various practical limitations and problems related to the collection of the data which make up supply and demand. These include sampling or other collection errors and/or data taken from different data sources which use different time periods, different spatial coverage, different fuel specifications, or different conversions from volume to mass or from mass to energy content in the supply and demand sides of the balance.

In general, the statistical difference is calculated by subtracting the supply with the demand as follows:

$$\text{Statistical Difference} = \text{Total Primary Energy Supply} + \text{Transfers} + \\ \text{Transformation} + \text{Energy Industries' Own Use} + \\ \text{Losses} - \text{Final Consumption}$$

EBT can be presented in both detailed and aggregated formats. The degree of detail depends on the policy concern, data and resource availability, and the underlying classifications used. Usually, a simplified format is used for small countries and/or for types of energy flows that are few and far between as the results can be summarised without much information loss. The detailed definitions of energy products and energy flows are shown in Annex 3, and the country's EBTs for 2000–2015 are provided in Annex 4. The structuring of an energy balance depends on the country's energy production and consumption patterns and the level of detail that the country requires.

Methodology

The definitions and groupings of energy products as well as statistical terminologies were harmonised with internationally established standards. The data for energy balances were based on the individual data collected for commodity (products) balances for coal, petroleum, gas, electricity, and renewables. The data are usually expressed in physical units of the products so that for each product, the completeness of the data can be observed from the commodity balance. The data in the commodity balance were combined to produce the energy balance.

Data Collection Format

The primary energy data required in the development of the Lao PDR 2000–2015 EBT was already discussed in Chapter 1. These data were entered in the reporting format for each energy product, which in the case of the Lao PDR consisted of coal; petroleum products; biomass (fuelwood, charcoal, bagasse); hydro; solar; and electricity (including imported electricity). The joint questionnaire used the format of the Asia-Pacific Economic Cooperation and the Association of Southeast Asian Nations (APEC–ASEAN) to build the main statistics on each product. This format checks the completeness of the data because the questionnaire balances the supply and use of the respective products. The APEC–ASEAN joint questionnaire consists of five questionnaires for coal, oil, gas, oil, electricity, and renewable energy products. The questionnaire basically consisted of the supply data, transformation, and energy industry own use and final consumption (including non-energy use).

After entering the data in the APEC–ASEAN joint format, which for the Lao PDR excludes the natural gas questionnaire, the researchers used the data to generate the EBT through

an interface programme provided by the Economic Research Institute of ASEAN and East Asia (ERIA) for the Lao PDR energy statistics project.

Unit and Conversion

All entries in the EBT are expressed as one energy unit: kilocalorie (kcal), gigajoule (GJ), thousand ton of oil equivalent (ktoe), etc. Net calorific values (NCV) are generally used in building energy balances since most current technologies are still not able to recover latent heat, which would thus not be treated as part of a fuel's energy-providing capability. However, providing both gross calorific value (GCV) and NCV while making clear which one is used in the balance is considered good practice. This allows the monitoring of technological advances in terms of recovering latent heat.²

The unit in the APEC–ASEAN joint questionnaire is the physical unit and it differs between the products. The unit in the oil questionnaire is in kiloton (kt) while the primary data unit is mainly in kilolitre (kl). Specific gravities data requirement is included in the oil questionnaire as well as the NCV to convert to the energy unit, kilocalories. If there is a refinery in the country, refinery intake data would also be requested in the questionnaire in kiloton.

The unit of coal in the questionnaire is also in kiloton, except for the gases produced from coal (coke oven gas, etc.) which are measured in gross kilocalories. For the other coal products, the calorific value data is also requested in the coal questionnaire. The unit of the new and renewable questionnaire is in kiloton for solid biomass (fuelwood, charcoal, and bagasse). The new and renewable energy is either in kilocalories or gigawatt-hour (GWh). The questionnaire also requests for the additional calorific value of the products.

The electricity questionnaire is in gigawatt-hour for production and consumption. For the fossil fuel input data, the unit is that of the products. A conversion data to kilocalorie is also requested in the questionnaire. The existing installed capacity is also included in the questionnaire in megawatt (MW).

The Lao PDR 2000–2015 EBT adopted the energy unit in ton of oil equivalent (toe). One unit of toe is defined as 10^7 kcal (41.868 GJ). There are two heat values: one is NCV and the other is GCV. The difference between NCV and GCV is:

- Coal/Oil: NCV is less than 5% of GCV; and
- Gas: NCV is around less than 10% of GCV.

² Department of Energy and Climate Change (DECC), United Kingdom. DECC Energy balance statistics methodology.

The calorific content of the different energy products in the Lao PDR is shown in Table 2.1. The conversion of the petroleum product's calorific value to the heat value uses the Thailand petroleum calorific value (assuming most petroleum products in the Lao PDR are imported from Thailand).

Also, the thermal efficiency of primary electricity such as hydropower generation is assumed as follows:

- Hydro: 100%
- Nuclear: 33%
- Geothermal: 10%
- Solar/Wind/Tide: 100%.

Table 2.1. Calorific Content of Energy Products in the Lao PDR

Energy Products	Original Unit	Calorific Content (Ton of oil equivalent)
Anthracite	Metric Ton	0.6000
Lignite	Metric Ton	0.3693
Motor Gasoline	Metric Ton	1.0450
Kerosene-Type Jet Fuel	Metric Ton	1.1675
Gas/Diesel Oil	Metric Ton	1.0236
Fuel Oil	Metric Ton	1.0105
Liquefied Petroleum Gas	Metric Ton	1.1777
Lubricants	Metric Ton	0.9928
Fuelwood and Wood Waste	Metric Ton	0.3820
Charcoal	Metric Ton	0.6900
Bagasse	Metric Ton	0.3000
Electricity	Megawatt-hour	0.0860

Source: Economic Research Institute for ASEAN and East Asia.

Treatment of Missing Data

Principles for Selecting the Source of Missing Data

In collecting data for the Lao PDR EBT, the research team classified data sources according to the following priorities:

- Priority 1: Direct owner of the data
- Priority 2: Official statistics
- Priority 3: Expert estimation.

Estimation Method for and Improvement of Missing Data

Chapter 1 on Lao PDR primary energy data identified the inconsistent data maintained by the Department of Energy, Policy and Planning (DEPP), Ministry of Energy and Mines. Such limitations of existing energy statistics result in unavailable information needed for the EBT and for estimation. The research team therefore applied estimation methods to the preliminary numbers of the existing energy statistics. These estimation methods are explained in this section.

Coal Data

The data for coal export in 2006 and 2007 had to be revised since only lignite coal was exported. Thus, the revised data in 2006 and 2007 applied only to lignite data. Lignite export in 2006 was increased so that production minus export would equal the consumption. In reverse, the 2007 lignite export was decreased so that production minus export would equal the consumption. After 2007, coal export data remained the same as collected by DEPP (Table 2.2).

Table 2.2. Export of Coal (kt)

Year	Export		
	Anthracite	Lignite	Total
2000		214	214
2001		227	227
2002		234	234
2003		253	253
2004		300	300
2005		320	320
2006		342	342
2007		382	382
2008		379	379
2009		400	400
2010		445	445
2011		465	465
2012	16	498	513
2013	45	200	245
2014	54	254	309
2015	0	0	0

kt = kiloton.

Source: Authors' calculation.

Data on domestic supply and consumption of coal in 2008–2015 were not balanced. In this case, the existing DEPP data for industrial consumption were revised to equal the supply. In 2015, because the Hongsa coal power plant became operational, total consumption for power and industry was set equal to the supply. The revised coal consumption of industry by coal type is shown in Table 2.3.

Table 2.3. Coal Consumption in the Industry Sector (kt)

Year	Export		Total
	Anthracite	Lignite	
2000	15		15
2001	20		20
2002	31		31
2003	38		38
2004	46		46
2005	51		51
2006	62		62
2007	75		75
2008	105	20	125
2009	112	57	168
2010	212	77	288
2011	225	156	381
2012	217	211	428
2013	200	610	810
2014	203	657	859
2015	136	841	976

kt = kiloton.

Source: Authors' calculation.

Table 2.4 shows the revised coal balance of the Lao PDR.

Table 2.4. Revised Coal Balance (kt)

Year	Production	Export	Total Supply	Consumption		Total Consumption	Balance
				Power Plant	Industry		
2000	229	214	15	0	15	0	
2001	247	227	20	0	20	0	
2002	265	234	31	0	31	0	
2003	291	253	38	0	38	0	
2004	346	300	46	0	46	0	
2005	371	320	51	0	51	0	
2006	404	342	62	0	62	0	
2007	457	382	75	0	75	0	
2008	504	379	125	0	125	0	
2009	568	400	168	0	168	0	
2010	733	445	288	0	288	0	
2011	846	465	381	0	381	0	
2012	941	513	428	0	428	0	
2013	1,055	245	810	0	810	0	
2014	1,168	309	859	0	859	0	
2015	4,793	0	4,793	3,817	976	4,793	

kt = kiloton.

Source: Authors' calculation.

Oil Data

As discussed in Chapter 1, the oil import data from the Department of Customs are inconsistent. The data on gasoline from 2010 to 2012, fuel oil in 2007 and 2008, Jet A-1 fuel from 2001 to 2013, and lubricant from 2006 to 2015 do not match the trend. Therefore, the import data on oil products were revised using a growth rate that was in line with the data trend. The 2009–2010 data on liquefied petroleum gas (LPG) were also revised by assuming that the import amount was equal to the total consumption of the household and commercial sectors. The import data on revised petroleum products are shown in Table 2.5.

Table 2.5. Import of Petroleum Products

Year	Jet A-1	Gasoline	DO	FO	Lubricant	LPG
	kl	kl	kl	kl	kl	ton
2000	45,730	101,676	214,461	3,875	260	1,801
2001	45,879	102,439	245,641	3,931	273	1,811
2002	46,029	108,002	247,574	4,392	349	1,892
2003	46,180	112,200	255,769	4,496	383	1,897
2004	46,330	119,879	262,904	4,505	433	1,926
2005	46,482	129,356	271,031	4,646	497	1,936
2006	46,634	143,473	375,295	4,682	605	2,132
2007	46,786	152,502	381,944	5,003	736	2,132
2008	46,939	159,455	457,327	5,346	896	2,151
2009	47,092	178,296	538,769	6,105	1,091	2,246
2010	47,246	187,755	538,769	6,130	1,521	2,314
2011	47,400	197,716	550,844	8,741	1,731	2,851
2012	47,555	208,205	601,588	8,459	1,970	2,954
2013	47,710	219,251	643,276	8,611	2,242	3,110
2014	47,866	212,950	688,907	10,067	2,552	3,510
2015	46,262	234,199	849,151	11,106	2,904	3,650

DO = diesel oil, FO = fuel oil, kl = kilolitre, LPG = liquefied petroleum gas.

Source: Authors' calculation.

Aside from the import data, the consumption data on petroleum products were also revised.

- The data on the consumption of gasoline for transportation were too high in 2007–2008 and too low in 2009–2012. These were revised with the assumption that import equals consumption.
- The data on kerosene type jet fuel were revised with the assumption that all imports were consumed by the airlines. Kerosene-type jet fuel was separated into domestic and international flights by using the calculated share of the domestic and international flights in the Lao PDR.
- The data on diesel oil consumption in the agriculture sector were assumed to be constant over the 2000–2015 period. Based on this, it was assumed that the remaining diesel oil were consumed by the industry sector. Thus, diesel oil consumption in the industry sector was calculated based on import minus the consumption of the transport and agriculture sectors.
- The data on fuel oil consumption of the industry sector from 2000 to 2011 were estimated based on the import data of fuel oil while data for 2015 were based on the trend consumption in 2014.

The revised petroleum product consumption data is shown in Table 2.6.

Table 2.6. Consumption of Petroleum Products

Year	Jet A-1		Gasoline		DO			FO		Lubricant		LPG	
	Transport	kl	Transport	kl	Transport	Industry	Agriculture	Transport	kl	Transport	kl	Commercial	Residential
2000	45,730	100,476	201,569	12,660	232	3,875	260	970	540				
2001	45,879	100,439	236,513	8,896	232	3,931	273	970	541				
2002	46,029	107,002	238,059	9,282	232	4,392	349	979	589				
2003	46,180	110,200	250,615	4,921	232	4,496	383	981	590				
2004	46,330	117,879	257,323	5,348	232	4,505	433	1,001	591				
2005	46,482	124,301	266,825	3,974	232	4,646	497	1,001	600				
2006	46,634	134,654	282,850	92,213	232	4,682	605	1,122	616				
2007	46,786	152,502	307,177	74,535	232	5,003	736	1,130	620				
2008	46,939	159,455	365,013	92,082	232	5,346	896	1,136	701				
2009	47,092	178,296	430,015	108,522	232	6,105	1,091	1,389	857				
2010	47,246	187,755	436,034	102,502	232	6,130	1,521	1,431	883				
2011	47,400	197,716	439,805	110,807	232	8,741	1,731	1,506	929				
2012	47,555	208,205	510,293	91,062	232	7,459	1,970	1,560	963				
2013	47,710	215,650	533,735	109,308	232	8,611	2,242	1,642	1,014				
2014	47,866	210,416	654,122	34,553	232	9,717	2,552	1,854	1,144				
2015	46,262	223,318	686,447	162,472	232	10,719	2,904	1,944	1,264				

DO = diesel oil, FO = fuel oil, kl = kilolitre, LPG = liquefied petroleum gas.

Source: Authors' calculation.

The data on petroleum product balance is shown in Table 2.7.

Table 2.7. Revised Petroleum Product Balance

Year	Jet A-1			Gasoline			DO				FO			Lubricant			LPG	
	kl			kl			kl				kl			kl			ton	
	Import	Domestic	International	Import	Transport	Industry	Agriculture	Import	Transport	Industry	Import	Transport	Industry	Import	Transport	Commercial	Residential	
2000	45,730	3,423	42,307	101,676	100,476	214,461	201,569	12,660	232	3,875	3,875	260	260	1,801	970	540		
2001	45,879	3,434	42,446	102,439	100,439	245,641	236,513	8,896	232	3,931	3,931	273	273	1,811	970	541		
2002	46,029	3,445	42,584	108,002	107,002	247,574	238,059	9,282	232	4,392	4,392	349	349	1,892	979	589		
2003	46,180	3,456	42,723	112,200	110,200	255,769	250,615	4,921	232	4,496	4,496	383	383	1,897	981	590		
2004	46,330	3,467	42,863	119,879	117,879	262,904	257,323	5,348	232	4,505	4,505	433	433	1,926	1,001	591		
2005	46,482	3,479	43,003	129,356	124,301	271,031	266,825	3,974	232	4,646	4,646	497	497	1,936	1,001	600		
2006	46,634	3,490	43,143	143,473	134,654	375,295	282,850	92,213	232	4,682	4,682	605	605	2,132	1,122	616		
2007	46,786	3,502	43,284	152,502	152,502	381,944	307,177	74,535	232	5,003	5,003	736	736	2,052	1,130	620		
2008	46,939	3,513	43,426	159,455	159,455	457,327	365,013	92,082	232	5,346	5,346	896	896	2,151	1,136	701		
2009	47,092	3,524	43,567	178,296	155,118	538,769	430,015	108,522	232	6,105	6,105	1,091	1,091	2,246	1,389	857		
2010	47,246	3,536	43,710	187,755	152,885	538,769	436,034	102,502	232	6,130	6,130	1,521	1,521	2,314	1,431	883		
2011	47,400	3,548	43,853	197,716	144,804	550,844	439,805	110,807	232	8,741	8,741	1,731	1,731	2,851	1,506	929		
2012	47,555	3,559	43,996	208,205	139,559	601,588	510,293	91,062	232	8,459	7,459	1,970	1,970	2,954	1,560	963		
2013	47,710	3,571	44,139	219,251	215,650	643,276	533,735	109,308	232	8,611	8,611	2,242	2,242	3,110	1,642	1,014		
2014	47,866	3,582	44,284	212,950	210,416	688,907	654,122	34,553	232	10,067	9,717	2,552	2,552	3,510	1,854	1,144		
2015	46,262	3,462	42,800	234,199	223,318	849,151	686,447	162,472	232	11,106	10,719	2,904	2,904	3,650	1,944	1,264		

DO = diesel oil, FO = fuel oil, kl = kilolitre, LPG = liquefied petroleum gas.

Source: Authors' calculation.

Electricity

The electricity production data contained in the Electricity Yearbook is the net production data. Therefore, the gross production of electricity in the APEC–ASEAN joint questionnaire was based on other sources. In the case of the transmission and distribution losses, total losses were calculated using the difference between the supply and demand (Table 2.8).

Table 2.8. Electricity Balance (GWh)

Year	Production	Export	Import	Consumption	Losses
2000	3,438	2,793	180	640	186
2001	3,654	2,871	184	710	256
2002	3,604	2,798	201	767	240
2003	3,178	2,285	229	884	239
2004	3,348	2,425	278	903	298
2005	3,509	2,506	330	1,011	323
2006	3,595	2,487	631	1,406	333
2007	3,374	1,741	793	1,616	810
2008	3,717	2,315	845	1,916	330
2009	3,366	1,921	1,175	2,258	362
2010	8,449	6,646	1,210	2,441	571
2011	12,969	10,669	904	2,556	649
2012	13,057	10,363	1,329	3,075	948
2013	15,510	12,494	1,272	3,381	907
2014	15,275	11,936	1,559	3,792	1,106
2015	16,302	11,549	2,050	4,239	2,565

GWh = gigawatt-hour.

Source: Authors' calculation.

Biomass

Data on biomass include fuelwood, charcoal, and bagasse, but DEPP manages only the production and consumption data for fuelwood and charcoal. As mentioned in Chapter 1, fuelwood production data is lower than consumption data. This trend is similar for charcoal until 2010. After 2010, charcoal production increased rapidly.

There were missing data on fuelwood consumption to produce charcoal, and on the biogas input to produce electricity in the biomass power plant. Thus, data on charcoal production was revised by assuming that production equals consumption. Based on the revised charcoal production data, the fuelwood requirement was estimated using the international efficiency standard of a fuelwood burner in a charcoal factory.

The total consumption of fuelwood now includes the consumption of the charcoal factory. Based on the revised fuelwood consumption data, fuelwood production is equal to consumption.

In the case of bagasse input to produce power, the efficiency assumption of the biomass power production is based on the international efficiency standard for biomass power production. The revised biomass data of the Lao PDR is shown in Table 2.9.

Lao PDR Energy Balance Table

The EBTs for 2000, 2005, 2010, and 2015 are shown in Tables 2.10 to 2.13. The complete EBTs from 2000 to 2015 are in Annex 4.

Table 2.9. Biomass Balance (kt)

Year	Fuelwood						Charcoal			Bagasse	
	Production	Consumption			Production	Consumption		Production	Consumption		
		Commercial	Residential	Industry		Industry Charcoal	Commercial			Residential	
2000	3298	420	2346	123	410	102	53	50			
2001	3377	430	2402	126	419	105	54	51			
2002	3458	440	2459	129	429	107	55	52			
2003	3540	451	2518	133	439	110	56	53			
2004	3625	461	2579	136	449	112	58	55			
2005	3712	473	2641	139	459	115	59	56			
2006	3800	484	2704	142	470	117	60	57			
2007	4120	523	2922	154	522	130	67	64			
2008	4476	561	3135	165	616	154	79	75			
2009	4462	542	3028	159	732	183	94	89			
2010	4371	527	2946	155	743	186	95	91			
2011	4281	512	2864	151	754	189	97	92			
2012	4149	498	2781	104	765	191	98	93			
2013	4131	502	2699	156	774	193	103	90	5	8	
2014	4181	508	2727	149	797	199	108	91	5	8	
2015	4234	514	2754	146	820	205	113	92	4	5	

kt = kiloton.

Source: Authors' calculation.

Table 2.10. Lao PDR's Energy Balance Table, 2000 (ktoe)

	1. Coal	4. Petroleum Product	4. Petroleum Product					6. Hydro	8. Geothermal, Solar, etc.	9. Others	10. Electricity	12. Total
			4.1 Motor Gasoline	4.3 Jet Fuel	4.5 Gas/Diesel Oil	4.6 Fuel Oil	4.7 LPG					
1. Indigenous Production	88								1,260		1,650	
2. Imports		312	78	44	184	3	2	0		15	328	
3. Exports	-79									-240	-319	
4. International Marine Bunkers												
13.1 International Aviation Bunkers		-41		-41							-41	
5. Stock Changes												
6. Total Primary Energy Supply	9	272	78	3	184	3	2	0	1,260	-225	1,618	
8. Total Transformation Sector								-296	-86	302	-86	
8.1 Main Activity Producer								-296	-86	302	-86	
8.8 Charcoal Processing												
9. Loss and Own Use										-22	-22	
10. Discrepancy		-1	-1	0	0	0	0	0		0	-1	
11. Total Final Energy Consumption	9	270	77	3	184	3	2	0	1,174	55	1,509	
12. Industry Sector	9	14			11	3			47	12	82	
13. Transport Sector		254	77	3	173			0			254	
13.2 Domestic Air Transport		3		3							3	
13.3 Road		251	77		173			0			251	
14. Other Sector		2			0		2		1,127	43	1,173	
14.1 Residential and Commercial		2					2		1,127	41	1,169	
14.1.1 Commerce and Public Services		1					1		197	13	210	
14.1.2 Residential		1					1		930	28	959	
14.2 Agriculture		0			0					3	3	
15. Non-energy Use		0						0			0	
16. Electricity Output in GWh								3,509			3,509	

GWh = gigawatt-hour, ktoe = thousand ton of oil equivalent, LPG = liquefied petroleum gas.

Source: This Working Group's own data source using international standard on Energy Balance Table Format, IEA, IEEI, 2018.

Table 2.11. Lao PDR's Energy Balance Table, 2005 (ktoe)

	1. Coal	4. Petroleum Product	4. Petroleum Product						6. Hydro	8. Geothermal, Solar, etc.	9. Others	10. Electricity	12. Total
			4.1 Motor Gasoline	4.3 Jet Fuel	4.5 Gas/Diesel Oil	4.6 Fuel Oil	4.7 LPG	4.10 Other Petroleum Products					
1. Indigenous Production	148							308		1,418		1,874	
2. Imports		384	100	44	233	4	2	0			28	412	
3. Exports	-118										-216	-334	
4. International Marine Bunkers													
13.1 International Aviation Bunkers		-41		-41								-41	
5. Stock Changes													
6. Total Primary Energy Supply	30	343	100	3	233	4	2	0	308	1,418	-187	1,912	
8. Total Transformation Sector									-308	-96	308	-96	
8.1 Main Activity Producer													
8.8 Charcoal Processing										-96		-96	
9. Loss and Own Use											-34	-34	
10. Discrepancy			-4	0	0		0			0	0	-4	
11. Total Final Energy Consumption	30	338	96	3	233	4	2	0		1,322	87	1,777	
12. Industry Sector	30	8			3	4				53	20	111	
13. Transport Sector		329	96	3	229			0				329	
13.2 Domestic Air Transport		3	3									3	
13.3 Road		325	96		229			0				325	
14. Other Sector		2			0		2			1,269	67	1,337	
14.1 Residential and Commercial		2					2			1,269	64	1,334	
14.1.1 Commerce and Public Services		1					1			221	20	242	
14.1.2 Residential		1					1			1,047	44	1,092	
14.2 Agriculture		0			0						3	3	
15. Non-energy Use		0						0				0	
16. Electricity Output in GWh									3,581			3,581	

GWh = gigawatt-hour, ktoe = thousand ton of oil equivalent, LPG = liquefied petroleum gas.

Source: This Working Group's own data source using international standard on Energy Balance Table Format, IEA, IEEJ, 2018.

Table 2.12. Lao PDR's Energy Balance Table, 2010 (ktoe)

	1. Coal	4. Petroleum Product						6. Hydro	8. Geothermal, Solar, etc.	9. Others	10. Electricity	12. Total
		4.1 Motor Gasoline	4.3 Jet Fuel	4.5 Gas/Diesel Oil	4.6 Fuel Oil	4.7 LPG	4.10 Other Petroleum Products					
1. Indigenous Production	320						741		1,670		2,731	
2. Imports		662	45	463	6	3	1			104	766	
3. Exports	-164									-572	-736	
4. International Marine Bunkers												
13.1 International Aviation Bunkers			-42								-42	
5. Stock Changes												
6. Total Primary Energy Supply	155	620	145	3	463	6	1	741	1,670	-468	2,719	
8. Total Transformation Sector								-741	-156	741	-156	
8.1 Main Activity Producer								-741		741		
8.8 Charcoal Processing									-156		-156	
9. Loss and Own Use										-64	-64	
10. Discrepancy	0	-27			0	0			0	0	-27	
11. Total Final Energy Consumption	155	593	118	3	463	6	1		1,514	210	2,472	
12. Industry Sector	155	93			88	6			59	61	369	
13. Transport Sector		497	118	3	374		1				497	
13.2 Domestic Air Transport		3	3								3	
13.3 Road		494	118		374		1				494	
14. Other Sector		3			0	2			1,455	149	1,607	
14.1 Residential and Commercial		2				2			1,455	145	1,603	
14.1.1 Commerce and Public Services		1				1			267	64	333	
14.1.2 Residential		1				1			1,188	81	1,270	
14.2 Agriculture		0			0					4	4	
15. Non-energy Use		1					1				1	
16. Electricity Output in GWh								8,621			8,621	

GWh = gigawatt-hour, ktoe = thousand ton of oil equivalent, LPG = liquefied petroleum gas.

Source: This Working Group's own data source using international standard on Energy Balance Table Format, IEA, IEEJ, 2018.

Table 2.13. Lao PDR's Energy Balance Table, 2015 (ktoe)

	1. Coal	4. Petroleum Product						6. Hydro	8. Geothermal, Solar, etc.	9. Others	10. Electricity	12. Total
		4.1 Motor Gasoline	4.3 Jet Fuel	4.5 Gas/Diesel Oil	4.6 Fuel Oil	4.7 LPG	4.10 Other Petroleum Products					
1. Indigenous Production	1,801						1,232	0	1,619		4,652	
2. Imports		971	44	729	10	4				176	1,147	
3. Exports										-993	-993	
4. International Marine Bunkers												
13.1 International Aviation Bunkers			-41								-41	
5. Stock Changes												
6. Total Primary Energy Supply	1,801	930	3	729	10	4	1,232	0	1,619	-817	4,765	
8. Total Transformation Sector	-1,410						-1,232	0	-173	1,453	-1,362	
8.1 Main Activity Producer	-1,410						-1,232	0	-2	1,453	-1,190	
8.8 Charcoal Processing									-172		-172	
9. Loss and Own Use										-272	-272	
10. Discrepancy	0	-9	0	0	0	-1		0	0	0	-9	
11. Total Final Energy Consumption	392	920	3	729	10	4			1,446	165	3,122	
12. Industry Sector	392	46		37	10				56	150	644	
13. Transport Sector		870	3	692		2					870	
13.2 Domestic Air Transport		3	3								3	
13.3 Road		867	172	692		2					867	
14. Other Sector		4		0	4				1,390	214	1,608	
14.1 Residential and Commercial		4			4				1,390	212	1,605	
14.1.1 Commerce and Public Services		2			2				274	74	351	
14.1.2 Residential		1		0	1				1,116	137	1,254	
14.2 Agriculture		0		0						3	3	
15. Non-energy Use		2				2					2	
16. Electricity Output in GWh	2,567						14,326	0	4		16,896	

GWh = gigawatt-hour, ktoe = thousand ton of oil equivalent, LPG = liquefied petroleum gas.

Source: This Working Group's own data source using international standard on Energy Balance Table Format, IEA, IEEJ, 2018.