

Chapter 5

Securing Affordable Energy for the Growing Industrial, Commercial, and Residential Sectors in Lao PDR

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1. Introduction

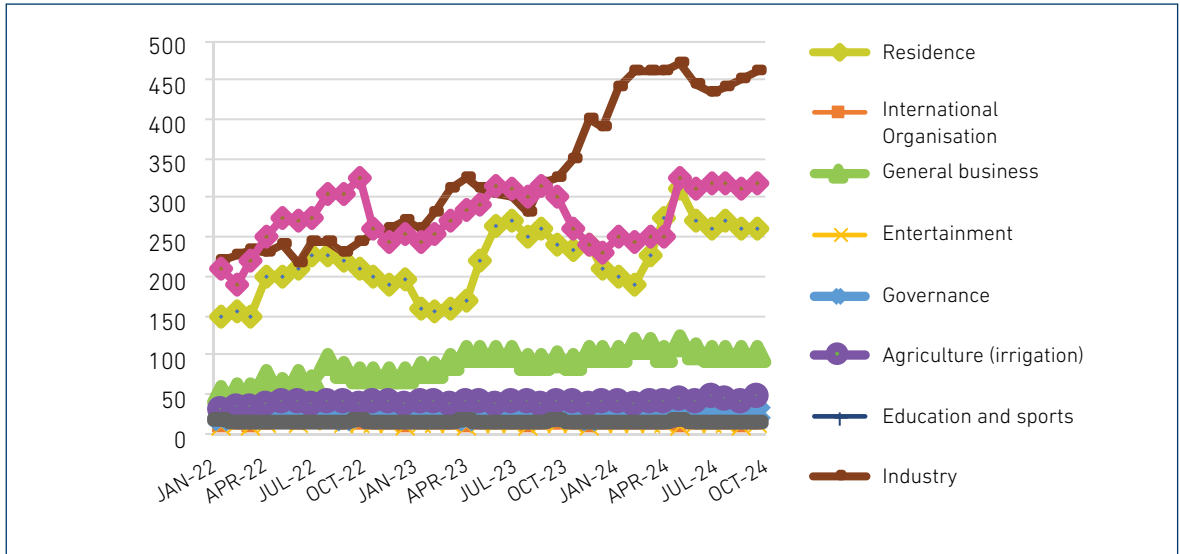
Energy is an engine of economic growth. Yet due to higher demand for energy, lack of a steady supply during the dry season, and high prices, it is also a barrier to economic growth in Lao People's Democratic Republic (Lao PDR). Therefore, securing affordable energy for growing industries there as well as its commercial and residential sectors is crucial.

Some studies exist related to energy development and its impact on Lao PDR, such as Kyophilavong, Phoumin, and Sayvaya (2023); Sousa et al., (2023); Kyophilavong (2023); and Kyophilavong et al. (2017). In addition, Lamphayphan et al. (2015) estimated the impact of the electricity supply from Lao PDR on Thailand. The main objective of this chapter, however, is to identify the key challenges and issues on securing affordable energy for industries and the commercial and residential sectors in Lao PDR. It is important to note that it focusses solely on the electricity sector, which is the main energy source for the industrial, commercial, and residential sectors in Lao PDR.

2. Electricity Demand

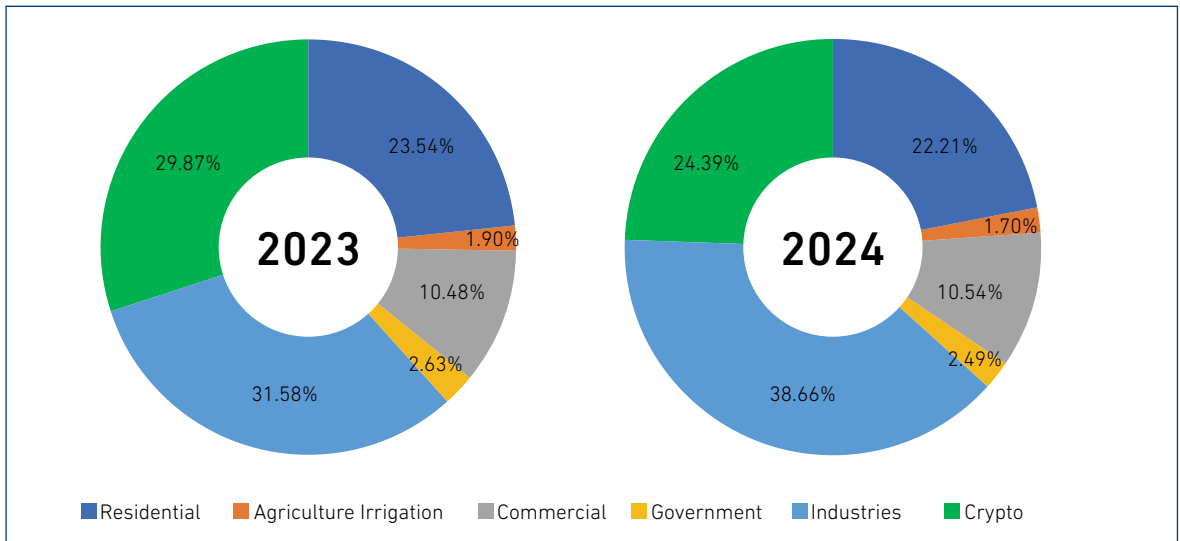
Table 5.1 shows the trends of electricity used by the industrial, commercial, and residential sectors in Lao PDR. Total domestic consumption will increase to 13,762.19 gigawatt-hours (GWh) in 2024, a total increase of 18.81% from 2023. The share of electricity from the industrial sector in the total mix will increase from 31.58% in 2023 to 38.66% in 2024. Those of the commercial and residential sectors will decline during the same period (Figure 5.2).

Figure 5.1. Electricity Use Trends in Lao PDR, 2023–2024
(gigawatt-hours)



Source: EDL (2024).

Figure 5.2. Electricity Demands of the Industrial, Commercial, and Residential Sectors in Lao PDR, 2023–2024



Source: EDL (2024).

There are several new economic activities that could increase the demand for energy in the future. These include Amata Smart and Eco City Natuey Industrial Estate and Amata Smart and Eco City Na Mor Industrial Estate, Saysettha Development Zone, Thanaleng Dry Port, VITA Park in Vientiane, Wangtao-Phonthong Economic Development Zone, and potassium-mining activities in the southern part of the country.

3. Electricity Supply

3.1. Electricity Balance

Table 5.1 shows that Lao PDR is a net electricity exporter. However, it also imports electricity from Thailand, especially during the dry season. Moreover, its electricity losses seem to be high compared to other Association of Southeast Asian Nations (ASEAN) Member States (Table 5.2). The national power grid also faces high distribution losses – an average loss of 13.0% in 2014, 6.8% in 2023, and 8.8% in 2022 (EDL, 2024).

Table 5.1. Electricity Balance in Lao PDR, 2000–2015
(gigawatt-hours)

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	3,509,000	2506	330	1,011	323
2006	3,595,000	2,487	631	1,406	333
2007	3,374,000	1,741	793	1,616	810
2008	3,717	2,315	845	1,916	330
2009	3,366	1,9210	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

Source: MEM and ERIA (2018).

3.2. Characteristics of Electricity Production

Private independent power producers (IPPs) own the most electricity generated in Lao PDR – 76% of the total – followed by Électricité du Laos Generation Company (EDL-Gen) at 18% and Électricité du Laos (EDL) at 5%. EDL is also a distributor of electricity in Lao PDR (Table 5.2). Therefore, EDL needs to purchase electricity from EDL-Gen and private IPPs. The sources of electricity production are from hydropower plants, which account for 95% of the total (Table 5.3).

Table 5.2. Characteristics of the Electricity Production by Owner

Owner	Production (kWh)	Share (%)
EDL	834,806,647	5.25
EDL-Gen	2,961,720,290	18.44
Private	12,252,068,246	76.30
Total	16,057,595,183	100.00

EDL = Électricité du Laos, EDL-Gen = Électricité du Laos Generation Company, kWh = kilowatt-hour.
 Source: EDL (2023).

Table 5.3. Characteristics of the Electricity Production by Source

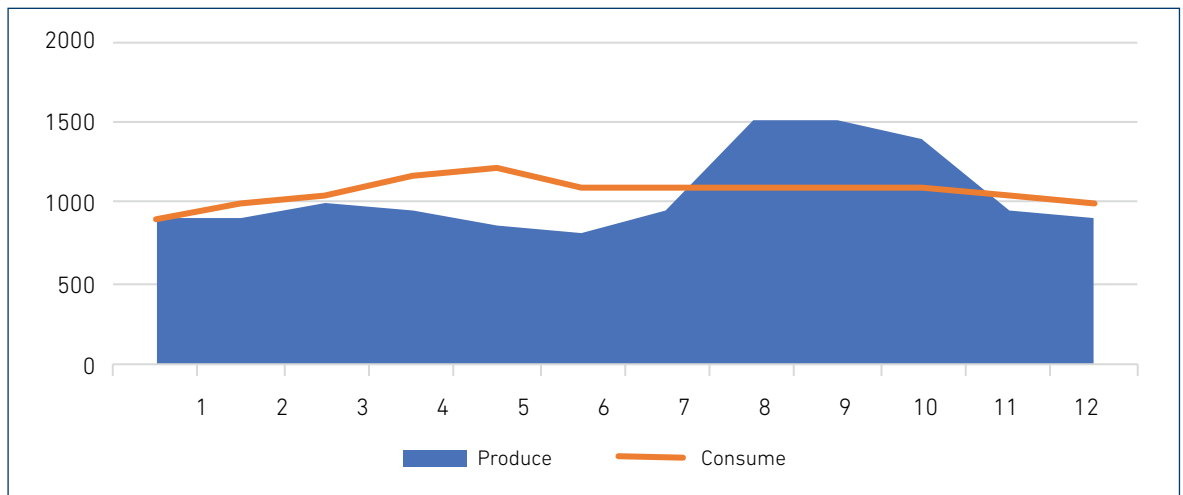
Source	Production (kWh)	Share (%)
Hydropower plant	15,321,289,849	95.41
Coal-fired power plant	604,716,480	3.77
Solar	103,077,814	0.64
Bio	28,511,040	0.18
Total	16,057,595,183	100.00

kWh = kilowatt-hour.
 Source: EDL (2023).

3.3. Gaps in Electricity Demand and Supply

The source of electricity generation in Lao PDR are hydropower plants; their production surpasses domestic demand during the rainy season and is insufficient during the dry season (i.e. April–July), which is also the hottest time of the year (Figure 5.3). Some hydropower plants do not have resources for storing water during the dry season.

Figure 5.3. Gaps in Electricity Demand and Supply, 2023
(GWh)



Source: EDL (2024).

Lao PDR must purchase electricity from the Electricity Generating Authority of Thailand (EGAT) during the dry season at higher prices but sells it at lower prices to EGAT during the rainy season (EDL, 2022). It is crucial to re-examine the contract and agreement procedure on this matter. Information on selling and purchasing electricity is in the Annex.

To deal with the shortage of electricity during the dry season, EDL and the Ministry of Mines and Energy (MEM) have plans to build several projects as seen in the below table.

Table 5.4. Projects to Enhance Amount of Electricity in Lao PDR

Area	Number	Type	Capacity (megawatts)	Production (gigawatt-hours/year)
Northern	4	Hydropower	305.0	1,198.0
Central	8	Solar	57.0	87.0
Southern	2	Hydropower	20.0	124.0
Unknown	24	Solar	345.5	589.3

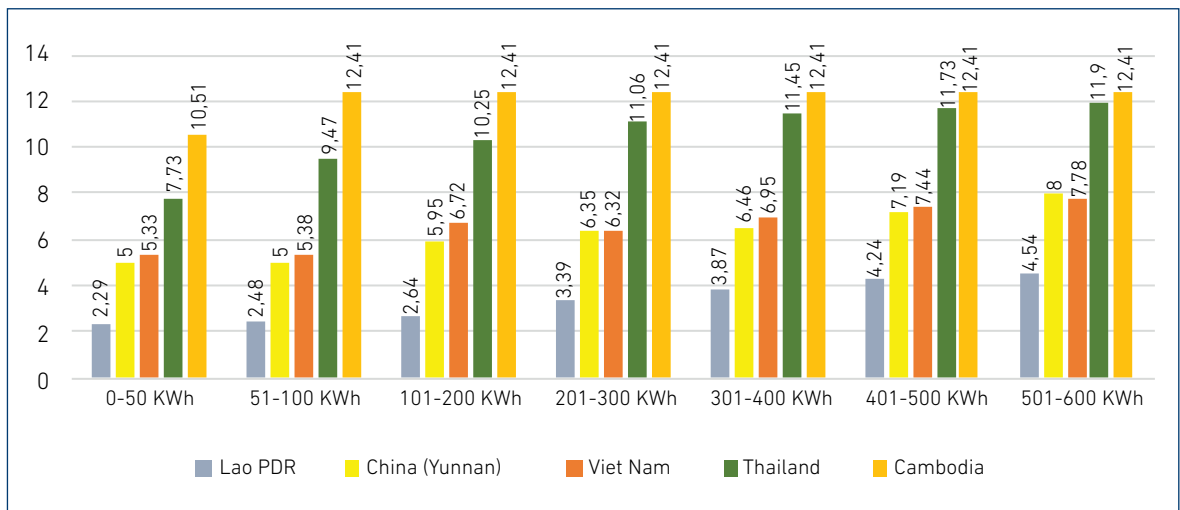
Source: EDL (2023).

Hydropower plants are generally constructed in remote areas, and they need to be connected to the national grid to supply energy to the whole country. The power grid, however, needs large investments and human resources to operate (EDL, 2023). As a result, hydropower plants are not connected to the national grid, and they do not transfer electricity to needed areas, such as the largest city of Vientiane.

3. Electricity Price-Setting

Affordable electricity prices are crucial to sustainable economic development in Lao PDR. Figure 5.4 shows electricity prices in Lao PDR compared to those in other ASEAN Member States; electricity prices in Lao PDR are US\$0.023/kilowatt-hour (kWh), the lowest price in the ASEAN.

Figure 5.4. Comparison of Electricity Prices in ASEAN
(US\$/kilowatt-hour)



ASEAN = Association of Southeast Asian Nations.
Source: EDL (2024).

In addition, price setting in Lao PDR is based on the amount of electricity used. The price is divided into six levels, depending on the electricity usage of residents. EDL sets low prices for small amounts of electricity use (level 1), which accounts for about 27% of total use. The price increases for 26–150 kWh (level 2), which accounts for the majority, 52% of total use. This price setting needs to be reconsidered, as it should be focussed on reducing prices for the poor and increasing prices as the use of electricity rises (Phoumin et al., 2015). Now, middle- and high-income households seem to pay less compared to their income and total expenditure. Many developing countries have subsidies for electricity prices; EDL should consider these (Han and Kimura, 2015).

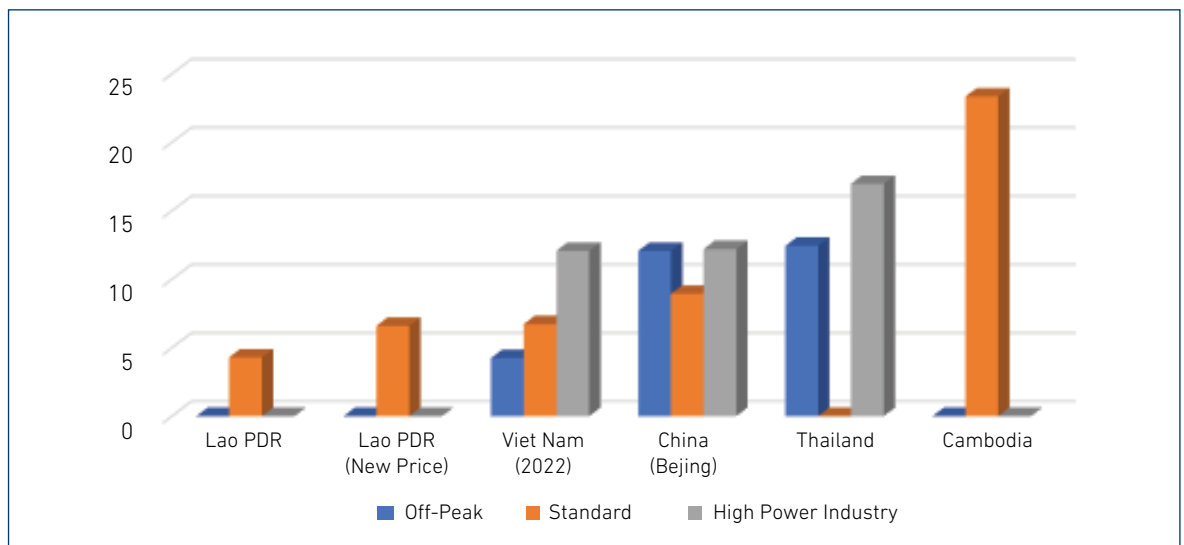
Table 5.5. Electricity Prices for the Residential Sector

No.	Level of Usage (kWh)	Price (KIP/kWh)	Electricity Usage (Households)	Electric Usage (%)	Payment (KIP/month)
1	0–25	355	401,836	27	355–8,875
2	26–150	422	789,437	52	9,297–61,625
3	151–300	815	206,929	14	62,440–183,175
4	301–400	898	46,970	3	184,773–273,675
5	401–500	948	23,458	2	274,659–372,075
6	> 500	1,019	39,916	3	373,074 KIP and 1,019/kWh Excess usage 501 kWh

kWh = kilowatt-hour.

Source: EDL (2023).

Moreover, electricity price setting for the residential sector is not based on demand and supply. The price is fixed all year, which is different from, for example, China, Thailand, and Viet Nam (Figure 5.5).

Figure 5.5. Electricity Prices across ASEAN
(US¢/kilowatt-hour)

ASEAN = Association of Southeast Asian Nations.

Source: EDL (2023).

In addition, electricity price setting for the non-residential sector is shown in the Annex. The recent development of cryptocurrency mining in Lao PDR has increased the high share of domestic electricity use. In September 2021, a new initiative was launched that permits the extraction and commercial exchange of cryptocurrencies. Notification No. 1158, issued by the Prime Minister's Office, establishes an agreement for the sale and purchase of electricity with six cryptocurrency enterprises participating. These companies will be required to pay a set cost for the energy that they consume during data processing or cryptocurrency mining. Moreover, to create new revenue streams, the government authorised 15 additional firms in 2023 to pilot a digital asset business involving cryptocurrency mining and trade in these currencies.

Cryptocurrency mining does not generate employment, but its spillovers affect the economy. Therefore, the electricity price setting for cryptocurrency mining should be evaluated, and some adjustments should be made.

4. Electricity Efficiency and Savings

Electricity efficiency and savings are crucial for Lao PDR; the government has issued a decree on energy saving and conservation (Government of Lao PDR, 2020). This is a small step forwards.

Electricity equipment used in the government and residential sectors is not efficient and must be replaced (Thøgersen and Grønhøj, 2010; Wang et al., 2011). Moreover, public awareness and literacy on energy savings and conservation are still low, so an education campaign should be implemented.

EDL also faces a budget deficit due to various reasons, including subsidies for the residential sector, purchases of electricity at high prices from EGAT during the dry season, electricity leakage, debts from the government sector, poor grid connections, and inefficient management. Therefore, improving the financial performance of EDL is crucial to a sustainable, affordable energy supply for all sectors in Lao PDR.

5. Conclusion and Recommendations

Energy is crucial to promoting economic growth in Lao PDR. Thus, the securing of affordable energy for all economic sectors is necessary. Current energy pricing – especially electricity tariffs – faces several challenges.

Electricity prices in Lao PDR are lower than those in other ASEAN Member States; this approach is based on government policies to provide cheap energy to residents and the private sector to improve livelihoods and to help develop industries. To sell electricity at the low prices set by the government, EDL must subsidise it, which incurs debt and in turn hurts economic development.

In addition, price setting in Lao PDR is not based on supply and demand. Electricity needs are surpassed during the rainy season, but electricity demand is unmet during the dry season. More than 80% of electricity for domestic use is from hydropower plants, but many plants do not have reservoirs to store water for use in the dry season. Therefore, EDL buys electricity from EGAT and other IPPs at high prices during the dry season. As it sells the electricity at low prices, heavy deficits are thus incurred at EDL.

The following is therefore recommended.

- (i) Electricity tariffs should be restructured based on demand and supply. Price setting should be based on a seasonal adjustment – normal season, rainy season, dry season. Price setting should also cover costs. On average, EDL purchased electricity from IPPs at US\$0.626/kWh. In 2023, about 11.5 million kWh were purchased, and in 2024, about 14.0 million kWh were purchased. EDL had to subsidise about US\$0.04–US\$0.05/kWh, which is estimated at US\$500 million–US\$600 million in 2024.
- (ii) The use of solar, wind, and biomass energy should be explored. The development of solar energy in hydropower plant reservoirs could be effective.
- (iii) Negotiations with IPPs and EGAT on purchasing electricity price setting should begin. EDL needs to negotiate with IPPs for electricity price adjustment, and IPPs need to lower their prices due to EDL's financial difficulties. The prices then could be raised in the medium and long run.
- (iv) Electricity loss must be reduced. The national power grid faced high distribution losses at an average of 13.0% in 2014, 8.8% in 2022, and 6.8% in 2023.
- (v) Electricity saving and efficiency should be promoted. Existing electrical equipment is generally of low efficiency, and awareness of electricity saving and efficiency are low.
- (vi) Power grids should be improved and connected. The development of a power grid link with southern China is crucial for purchasing electricity during the dry season. In addition, it is a chance to sell electricity to China during the rainy season. It is also important to help develop the ASEAN Power Grid.
- (vii) Effective coordination and cooperation between line agencies should be encouraged. The government should improve the coordination mechanism to secure energy to promote industry development and economic growth.
- (viii) Reforms to EDL must continue. The Prime Minister appointed a committee to reform EDL, but it has stopped meeting. International donors, experts, and academia should be consulted as well. In addition, the chair should be at a higher position than in the previous committee.
- (ix) Electricity from hydropower plants must be secured, as currently, more than 90% is exported to neighbouring countries. Due to the increasing demand for electricity domestically, it is crucial that enough is retained for domestic use.

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Annex

Table 5.A1. Electricity Prices with EGAT
(B/kWh)

Time	EGAT Buying from EDL	EGAT Selling to EDL
Peak: 9:00–22:00, Monday–Friday		
Off-Peak: 22:00–9:00, Monday–Friday; Saturday and Sunday (all day); off days	2.10	2.20

EDL = Électricité du Laos, EGAT = Electricity Generating Authority of Thailand, kWh = kilowatt-hour.

Sources: EDL (2024).

Table 5.A2. Wholesale Rate of Electricity
(B/kWh)

Time	Rate
Peak: 9:00–22:00, Monday–Friday	4.0476
Off-Peak: 22:00–9:00, Monday–Friday; Saturday and Sunday (all day); off days	2.3555

kWh = kilowatt-hour.

Sources: EDL (2024)

Table 5.A3. Energy Price Setting, 2023

No.	User	Price	Monthly Price (Feb–May)	Monthly Price (Jun–Aug)	Monthly price (Sep–Dec)
Non-Residential					
A	Low-Voltage Sectors				
1	International Organisations	1,448	1,945	2,053	2,160
2	General Businesses	1,123	1,509	1,592	1,675
3	Education and Sports Businesses				
3.1	Education	882	1,163	1,223	1,283
3.2	Sports	882	1,390	1,499	1,608
4	Entertainment	1,487	1,012	2,125	1,137
5	Governance	882	1,187	1,253	1,318

No.	User	Price	Monthly Price (Feb–May)	Monthly Price (Jun–Aug)	Monthly price (Sep–Dec)
6	Agriculture and Irrigation				
6.1	Irrigation and Folk Art	537	926	1,009	1,092
6.2	Commercial Agriculture	537	1,110	1,233	1,356
7	Industry				
7.1	Processing	795	1,295	1,402	1,509
7.2	Agriculture-Processing Plants	795	12,272	1,375	1,477
B Middle-Voltage Sectors					
1	International Organisations	1,448	1,764	1,402	1,509
2	General Businesses	795	1,272	1,375	1,477
3	Education and Sports Businesses				
3.1	Education	749	1,015	1,072	1,129
3.2	Sports	749	1,215	1,315	1,415
4	Entertainment	1,413	1,802	1,886	1,969
5	Governance	749	1,037	1,098	1,160
6	Agriculture and Irrigation				
6.1	Irrigation and Folk Arts	457	810	885	961
6.2	Commercial Agriculture	457	1,061	1,191	1,320
7	Industry				
7.1	Processing	728	1,149	1,239	1,329
7.2	Agriculture-Processing Plants	728	1,128	1,213	1,299
7.3	Mining and Ore Processing	728	1,471	1,631	1,790
7.4	Special Economic Zones	728	1,255	1,369	1,482
C 115-Kilowatt Voltage or More					
1	General Businesses	954	1,267	1,334	1,401
2	Industry				
2.1	Processing	728	1,121	1,205	1,289
2.2	Agriculture-Processing Plants	728	1,083	1,159	1,235
2.3	Mining and Ore Processing	728	1,434	1,585	1,736
2.4	Special Economic Zones	728	1,206	1,309	1,411
3	High-Speed Railway	728	1,301	1,424	1,547

Source: EDL (2024).