FORECAST OF ELECTRICITY DEMAND FOR THE NEXT 5 YEARS IN THE NATIONAL STRATEGIC AREA OF LAKE TOBA IN THE FRAMEWORK OF SUPPORTING NATIONAL TOURISM IN SIMALUNGUN DISTRICT (CASE STUDY OF PARAPAT CITY)

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Abstract

The availability of electric power is an obligation at this time, because the economic and social activities of the people of a region continue to increase. Simalungun Regency is an area in the middle of the island of Sumatra. Simalungun Regency's electricity is currently quite good. On the other hand, the island of Simalungun Regency has a lot of potential from various sectors, especially tourism, especially the Lake Toba area. Both of these require business developers and the government to maintain the continuity of the supply of electrical energy. Problems regarding electricity will arise if there is an imbalance between the electrical energy produced and what is requested by the customer. In order for this problem to be overcome, a strategy is needed, namely forecasting the demand for electrical energy within a certain period of time so that the distribution of electrical energy becomes efficient. Based on data from PT PLN (Persero) for the North Sumatra Region, Parapat City Area, Simalungun Regency, total electricity consumption in 2017 has reached 22,311,374 kWh. By using the econometric method that takes into account the influence of the Gross Regional Domestic Product (GRDP), capable capacity, electrification ratio, it can be known the amount of electricity consumption in the coming year. Based on the results of the calculation of the electricity load forecasting in 2022, the total consumption of electrical energy has reached 46,149,759.6069 KWh which is an increase of around 106.84% from 2017 which comes from four types of customers, namely households, commercial, public and industrial. Based on data from PT PLN (Persero) for the North Sumatra Region, Parapat City Area, Simalungun Regency, total electricity consumption in 2017 has reached 22,311,374 kWh. By using the econometric method that takes into account the influence of the Gross Regional Domestic Product (GRDP), capable capacity, electrification ratio, it can be known the amount of electricity consumption in the coming year. Based on the results of the calculation of the electricity load forecasting in 2022, the total consumption of electrical energy has reached 46,149,759.6069 KWh which is an increase of around 106.84% from 2017 which comes from four types of customers, namely households, commercial, public and industrial. Based on data from PT PLN (Persero) for the North Sumatra Region, Parapat City Area, Simalungun Regency, total electricity consumption in 2017 has reached 22,311,374 kWh. By using the econometric method that takes into account the influence of the Gross Regional Domestic Product (GRDP), capable capacity, electrification ratio, it can be known the amount of electricity consumption in the coming year. Based on the results of the calculation of the electricity load forecasting in 2022, the total consumption of electrical energy has reached 46,149,759.6069 KWh which is an increase of around 106.84% from 2017 which comes from four types of customers, namely households, commercial, public and industrial. By using the econometric method that takes into account the influence of the Gross Regional Domestic Product (GRDP), capable capacity, electrification ratio, it can be known the amount of electricity consumption in the coming year. Based on the results of the calculation of the electricity load forecasting in 2022, the total consumption of electrical energy has reached 46,149,759.6069 KWh which is an increase of around 106.84% from 2017 which comes from four types of customers, namely households, commercial, public and industrial. By using the econometric method that takes into account the influence of the Gross Regional Domestic Product (GRDP), capable capacity, electrification ratio,

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it can be known the amount of electricity consumption in the coming year. Based on the results of the calculation of the electricity load forecasting in 2022, the total consumption of electrical energy has reached 46,149,759.6069 KWh which is an increase of around 106.84% from 2017 which comes from four types of customers, namely households, commercial, public and industrial.

INTRODUCTION

Simalungun Regency is one of the districts that has a lot of potential, especially in the agricultural, plantation and tourism sectors, where these four sectors greatly affect the economic growth of the Simalungun Regency area. So to support the development of potentials in these sectors, especially in the ever-growing tourism sector, namely the Lake Toba National Strategic Area, the government and business developers are required to provide the required infrastructure. One of the main and most important infrastructure is the availability of supply or supply of electrical energy. In Simalungun Regency, there are still rotating power outages. Electrical Energy is an integral part of the development of human civilization in various fields, both in terms of technology, economics, social and culture. The demand for electricity needs which continues to increase in line with population growth and economic development, requiring electricity providers to ensure the availability of stable and adequate electricity. The lack of availability of electricity will disrupt economic activities which can harm the community. Therefore, the reliability of the electricity supply is important. PLN is the main supplier and distributor of electrical energy in Indonesia, so PLN indirectly becomes the backbone of the people's economy. Electricity distributed to the public is divided into several types of customers, including distributed to households, offices and industry. Each of these consumers has different electricity consumption characteristics depending on the type of load used.

Problems regarding electricity will arise if there is an imbalance between the electrical energy produced and the electrical energy requested by the customer. If the supply of electricity is more than requested by the customer, there will be a waste of electricity and losses on the part of the supplier. If the supplier does not fulfill the customer's demand, there will be power outages and losses will be experienced by the customer. So that this problem can be overcome without compromising the supplier or the customer, a strategy is needed, namely a projection or forecast of electricity demand in the long term so that later it can be estimated how much electricity will be distributed to customers.

Objective

1. To find out the magnitude of the growth in the electricity load in the Lake Toba National Strategic Area, especially the city of Parapat in Simalungun Regency from 2018 to 2022 in terms of the household, commercial, public and industrial sectors

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2. To find out information regarding the increase in the number of customers in the next few years within the PLN National Strategic Area of Lake Toba, especially the city of Parapat, Simalungun Regency.

3. To find out the increase in the burden in the next few years within the PLN National Lake Toba Strategic Area, especially the city of Parapat, Simalungun Regency.

LITERATURE REVIEWS

Geographical Conditions of Lake Toba Region
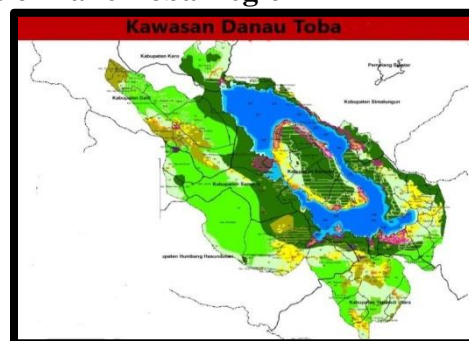
Picture of Lake Toba Area Location

The existence of Lake Toba with its natural beauty makes the surrounding area a priority object and tourist attraction in North Sumatra. This city developed and was known as a tourist area until it experienced rapid development around the 1990s which has many hotels, restaurants, inns and other supporting facilities including a pier that connects Parapat with Samosir Island. Located at an altitude of 900 meters above sea level, clear blue water and green hills around it

makes Lake Toba so special. Not to mention the cool air on its shores and the extent of the lake that looks like an ocean. Even on one of the shores of the lake, the pride of the Medan people has white sand like a beach. Lake Toba is perfect for making you feel at home there.

Administratively, Lake Toba is located in the Province of North Sumatra with geographic coordinates 3.58°N 98.67°E. From Medan you have to travel about 165 kilometers to get to this location. Lake Toba is surrounded by volcanoes which are part of the Bukit Barisan Mountains. There are many beautiful pine and eau trees around the lake. Not only that, to the north of Lake Toba you can find various fauna such as orangutans, langurs and several types of monkeys. While in the south there are lingur, ingkir and tapir monkeys.

A Brief History of PT. PLN (Persero) Simalungun Regency Branch

The history of electricity in North Sumatra is not new. If electricity began to exist in Indonesian territory in 1893 in the Batavia area (now Jakarta), then 30 years later (1923) electricity began to exist in Medan.

The center was built on the hermitage of the Medan branch of the PLN office, which is now at electricity road No. 12 Medan, built by NV NIGEM / OGEM, a Dutch private

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company. Then followed the construction of electricity at Tanjung temple and brandan base (1924), high cliffs (1927), Sibolga (NV ANIWM) Berastagi and Tarutung (1929), Tanjung Balai in 1931 (belonging to Gemeente-Kotapraja), Labuhan cubicle (1936) and Cape Oysters (1937).

During the Japanese colonial period, the Japanese only took over the management of a Dutch private electricity company without any additional machines or network expansion. The working area was divided into electricity companies divided into North Sumatra electricity companies, Java electricity companies and so on according to the organizational structure of the government of the Japanese army at that time.

Data is something that is known from various things or events in real terms or is the result of observations. Data is divided into several types, namely:

1. By Nature
   - Qualitative data is data that is not in the form of numbers and is more of a statement in nature.
   - Quantitative data is data in the form of numbers.
2. Based on Source
   - Internal data is data that describes the state of a company or organization.
   - External Data is data that describes conditions outside an organization

that can affect the results of the work of the organization.

3. Based on How to Obtain
   - Primary data is data that is collected by individuals or an organization directly from the results of observing the object under study.
   - Secondary data is data obtained through a party or organization

both from publications and requests to companies authorized for data collection.

4. Based on Collection Time
   - Cross Section data is data that is collected at a certain time only

(at a point of time).

   - Periodic data (time series) is data collected at a certain time span to describe the growth of an object.

Classification of Periodic Data Patterns (Time Series)
In the classification of time series data patterns, it is divided into four types that have different characteristics, namely:

1. Random (Stationary)
      Random patterns caused by unpredictable or irregular events, such as wars, elections, landslides or other natural disasters.
2. Trends (Trends)

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This data development pattern forms a characteristic that is close to a linear line. The ups and downs of the gradient show an increase and decrease in data values based on time.

3. Seasonality

Patterns that are formed because there are habitual patterns of data in a small period so as to produce similar graphs over a certain period of time repeatedly.

4. Cyclic (Cycle)

Patterns that have similar characteristics to seasonal patterns, but have a longer repetition period. The following Figure 2.1 is a classification of periodic data patterns.
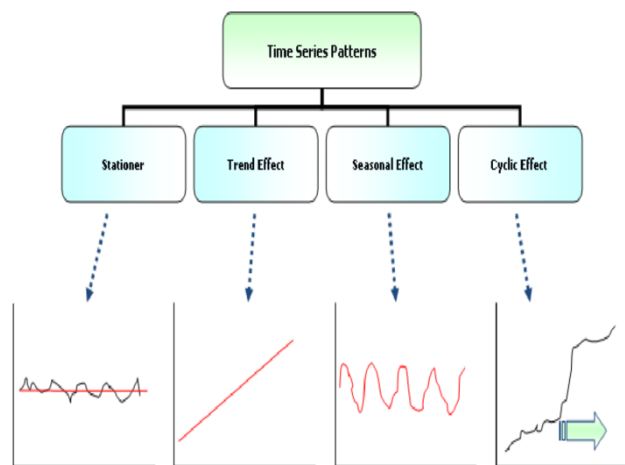

Image of Periodic Data Pattern (Time Series) (Source: PT PLN (Persero), 2014)

Electrical Expense Forecast

Forecasting or forecasting is a process of predicting systematically about something that is most likely to happen in the future based on past and present information that is owned, so that errors (the difference between something that happens and the estimated results of estimates or estimates) can be minimized. Forecasts do not have to give a definite answer about what will happen, but try to find answers as close as possible to what will happen. Forecasting is the use of past data from a variable or set of variables to estimate its value in the future. Electrical load forecasting is an important tool and is used to ensure that the energy provided by the provider (PLN) meets the load plus energy losses in the system. Forecasts can have qualitative or quantitative properties as in the explanation of previous data. Quantitative forecasts are divided into two, namely single forecasts (point forecasts) and interval forecasts (interval forecast).

Electrical Load Forecast Method

The output from forecasting costs is generally in the form of forecasts of annual energy sales. The electric energy provider usually estimates the first annual energy sales and uses the energy sales in determining the annual peak load demand forecast. There are

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three methods used in forecasting electrical energy loads, namely the econometric regression analysis, the application saturation method, and the end-use energy method.

Electrical Load Forecasting with the Econometric Method

Econometrics is the result of a certain review of the role of economics, including the application of mathematical statistics to economic data to provide empirical support to models based on economic mathematics and obtain results in the form of numbers. The econometric method uses regression analysis to obtain the model used in forecasting electrical loads.

Forecasting Electrical Energy Needs Per Customer Sector

By reviewing in general the approach used in calculating energy needs, electricity users (consumers) are grouped into four consumers, namely:

1. Household Consumers,
2. Commercial Consumers,
3. Public Consumers,
4. Industrial Consumers.

While the variables considered to have an influence on the demand for electrical energy include Gross Domestic Product (GDP) Total Population (POP),
Urban Area Population (UPOP) and number of electrified households (NHE). Also used is the Electrification Ratio (ER) which is defined as the percentage of the number of electrified households divided by the total number of households

METHODS

Place and time

The research was carried out at PLN Parapat Region, North Sumatra. The research will be carried out after the completion of the seminar the proposal has been approved. The duration of the research is planned for 2 (two) weeks.

Materials and Equipment

The materials used to conduct this research are disturbance data that occurred at PLN Parapat Region, North Sumatra, Parapat City Area, Simalungun Regency. The equipment to be used in this research is Microsoft Excel software.

Observed Data and Variables

The data observed in this study are data on the number of households, the number of residents, the number of customers, the amount of electricity consumption, GRDP and capable and installed capacity.

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Table of data on the number of household customers, the number of households and the number of people served by PLN, Parapat City, Simalungun Regency

Year	Amount Household (RT)	Amount Resident (Soul)
2013	14,542	55,356
2014	14,569	55,488
2015	14,717	56011
2016	14,963	56,247
2017	15,616	56,458

Table of Data for the Total Number of Customers & Number of Customers per Sector Served by the PLN Area, Parapat City, Simalungun Regency

Year	Amount Customer RT	Amount Customer commercial	Amount Customer Public	Amount Customer Industry	Amount Total Customer
2013	13,722	458	470	7	14,657
2014	14,067	511	477	7	15,062
2015	14,568	512	498	7	15,585
2016	14,984	523	532	6	16,045
2017	15,502	535	563	6	16,206

Table of Total Electrical Energy Consumption Data & Customers per Sector, served by the PLN Area, Parapat City, Simalungun Regency

Year	Consumption RT Customer	Consumption Commercial Customers (kWh)	Consumption Public Customers	Consumption Industrial Customers	Consumption Total (kWh)
2013	12,188,754	3,295,347	2,654,266	233,963	18,372,330
2014	12,925,797	3,975,426	2,685,976	223,135	19,810,334
2015	14,006,543	4,421,415	2,769,954	205,270	21,403,182
2016	14,413,904	4,791,959	2,854,282	151,185	22,211,330
2017	14,243,152	5,066,173	2,861,231	140,818	22,311,374

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Data Table of Installed Capacity and Capable Capacity

Year	Installed capacity (kW)	Capable Capacity (kW)
2013	11,999	8935
2014	13040	9938
2015	13,646	10,520
2016	13,798	12003
2017	15.146	12,453

Table of Gross Regional Domestic Product Data for City Areas served by PLN
Parapat, Simalungun Regency

Year	Household GRDP (Million Rupiah)	Industrial GRDP (Million Rupiah)
2013	12,237,901	17.105.121
2014	13,529,167	16,973,489
2015	14,741,983	15,704,951
2016	15,740,462	23,203,075
2017	17,279,556	25,772,584

Determine the sample area

The search for information and data is Parapat City, Simalungun Regency. The reason for choosing this area is because we know that Parapat City, Simalungun Regency is one of the developing areas but has a lot of potential, such as in agriculture, fisheries, and especially in the tourism sector. It is undeniable that in the area there will be many immigrants or tourists who will cause an increase in electricity consumption later. For example, if there are many tourists, lodging such as hotels or guesthouses will cause an increase in electricity consumption.

Data Processing Stage

The next stage after obtaining data and information is data processing by determining historical load patterns per month and year, as well as checking the validity of data and information before carrying out load forecasting. The data processing process can be illustrated through Figure (3.1) block diagram, as follows:

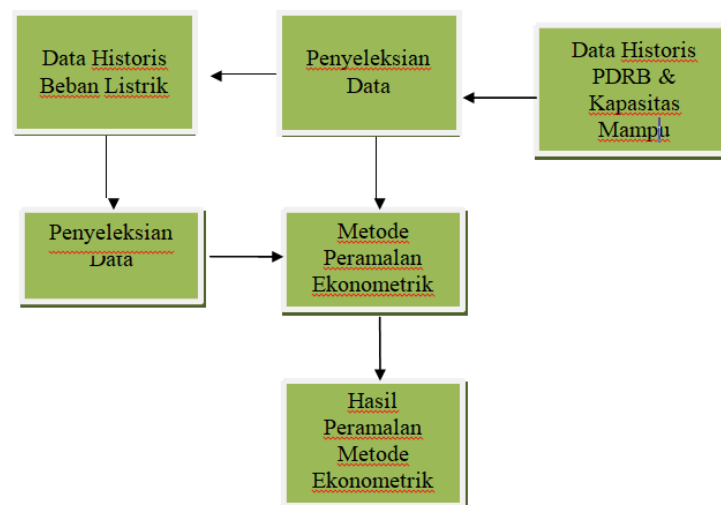Ben Setiawan[1], Ian Wooton[2], Diana Florenta Butar-Butar[3], Hadi Panjaitan[4]. Jopinus Saragih[5].

Figure Block Diagram of Data Processing Process

The data obtained, among others:

1. Data on electricity consumption per sector of PT PLN (Persero) Parapat City Area, Simalungun Regency from 2013 to 2017.
2. Data on the number of customers per sector of PT PLN (Persero) Sumatra Region
    North, Parapat City Area, Simalungun Regency from 2013 to 2013
    2017.
3. Gross Regional Domestic Product (GRDP) data, data on the number of households and data on the total population of the Parapat City Area, Simalungun Regency, year
    2013 to 2017.
4. Installed capacity data and capable capacity data of the Parapat City branch Simalungun Regency in 2013-2017
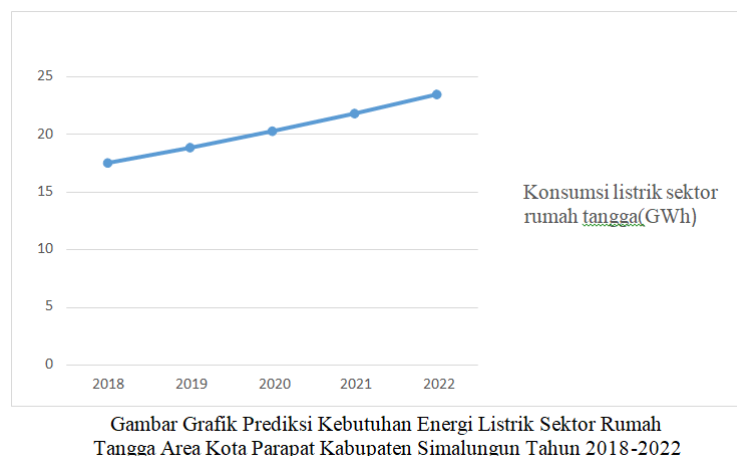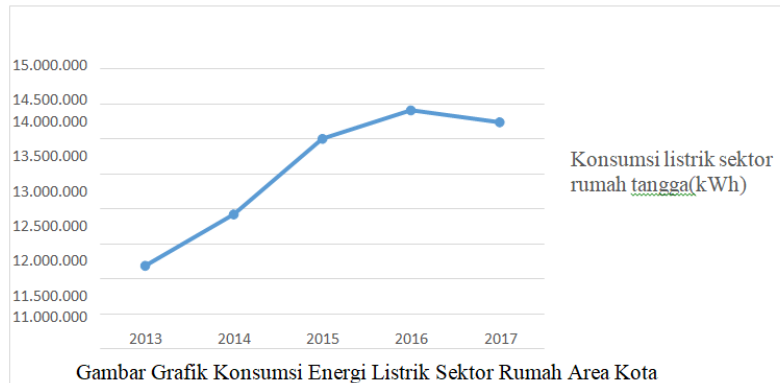
Before carrying out the analysis process, the parameter values must be calculated in advance by the econometric method for forecasting electricity demand. The calculation for forecasting electrical energy is done manually and also with the help of Microsoft Excel supporting software. After obtaining all the parameters for forecasting the electric load, then proceed with displaying the results in graphical form.

Data Analysis Stages

After processing the data, the next step is the process of forecasting the electric load, where the selection of the right method greatly influences the final result. The selection of this method is based on available data. In this study, the econometric method was used which utilized the linear regression analysis method. And from the graphic data obtained from the calculations, it will be seen how much electricity consumption will be in the coming year, namely 2018-2022.

RESULTS AND DISCUSSION

Household Sector Graphic Analysis

Gambar Grafik Konsumsi Energi Listrik Sektor Rumah Area Kota Parapat Kabupaten Simalungun Tahun 2013-2017

Gambar Grafik Prediksi Kebutuhan Energi Listrik Sektor Rumah Tangga Area Kota Parapat Kabupaten Simalungun Tahun 2018-2022

From the figure it can be seen that the household sector's electricity consumption in 2013 was 12,188,754 kWh and in 2017 was 14,243,152 kWh, which experienced an increase of 2,054,398 kWh or around 2,054 GWH. And it can be seen that the average growth in the household sector's electricity consumption per year from 2013 to 2017 was around 0.41 GWH or around 4.035% per year.

And from Figure 4.7 it can be seen that the predicted consumption or demand for electrical energy in the household sector in 2018 is 17,542,420 KWH, which has increased by 3,299,268 kWh or around 3¸3 GWH from 2018.

2017, and will continue to increase to 23,474,356 kWh or around 23.47 GWH in 2022 or can be said to have experienced more than one and a half times more (1.6 times) than in 2017, so the prediction of the growth of the household sector's electricity demand from 2017 to 2022 has increased by

5,931,936 kWh. or around 5.9 GWH and it can be seen that the average predicted growth in the household sector's electricity demand per year from 2018 to 2022 is 1,186,387 kWH or around 1.17 GWH, or around 7.55% per year.

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So it can be seen that the demand for electrical energy in the household sector in the Parapat City area, Simalungun Regency from 2013 to 2022 has increased significantly, namely 11,285,602 kWh or around 11.23
GWH, so it can be seen that the average growth in the household sector's electricity demand per year from 2013 to 2022 is 1,128,560 kWh or around 1.13 GWH per year. And based on the predicted results of population and household growth in 2018-2022, we can see that the number of household growth is so large and when compared to the availability of existing electrical energy, it is feared that PLN will not be able to meet the demand for electrical energy in the next five years.

Commercial Sector Graphic Analysis
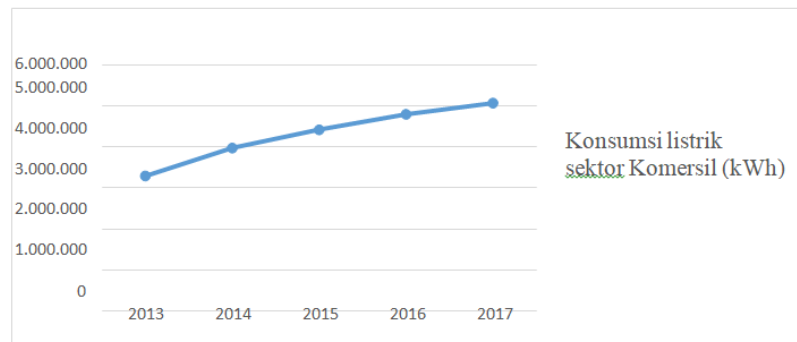
Gambar Grafik Konsumsi Energi Listrik Sektor Komersil Area Kota
Parapat Kabupaten Simalungun Tahun 2013-2017
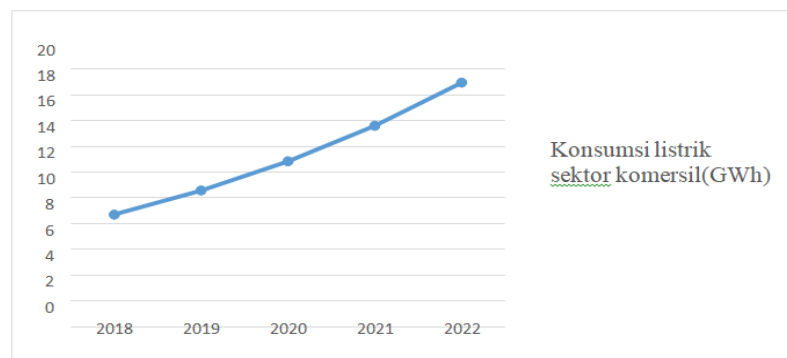
Gambar Grafik Prediksi Kebutuhan Energi Listrik Sektor Komersil
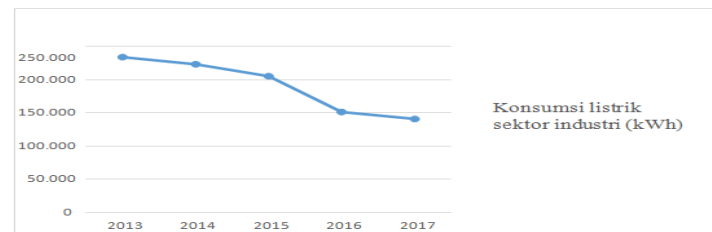Area Kota Parapat Kabupaten Simalungun Tahun 2018-2022

From Figure 4.8 it can be seen that the commercial sector's electricity consumption in 2013 was 3,295,347 kWh and in 2017 was 5,066,173 kWh, which experienced an increase of 1,770,826 kWh or around 1.77 GWH. And it can be seen that the average growth in the commercial sector's electricity consumption per year from 2013 to 2017 was around 354,165 kWH or around 0.35 GWH or around 11.49% per year.

And from Figure 4.9 it can be seen that the prediction of the consumption or demand for electrical energy in the commercial sector in 2018 is 8,708,477.25 kWh, or

around 8.71 GWH which has increased by 3,642,304.25 kWh or around 3.64 GWH from 2018. 2017, and will continue to increase to 18,948,510 ,

51 kWh or around 18.94 GWH in 2022, so the prediction of the growth of commercial sector electricity demand from 2018 to 2022 will increase by 10,240,033.27 kWH. or around 10.24 GWH. And it can be seen that the predicted average growth of commercial electricity demand per year from 2018 to 2022 is 2,048,006.65 kWH or around 2.048 GWH or around 21.45% per year.

So it can be seen that the demand for electrical energy for the commercial sector in the area of Parapat City, Simalungun Regency from 2013 to 2022 has increased significantly as has the household sector, namely

15,653,163.51 kWh or around 15.65 GWH, so it can be seen that the average growth of the public sector's electricity demand per year from 2013 to 2022 is 1,565,316.35 kWh or around 1.56 GWH per year.

Gambar Grafik Konsumsi Energi Listrik Sektor Industri Area Kota Parapat Kabupaten Simalungun Tahun 2013-2017
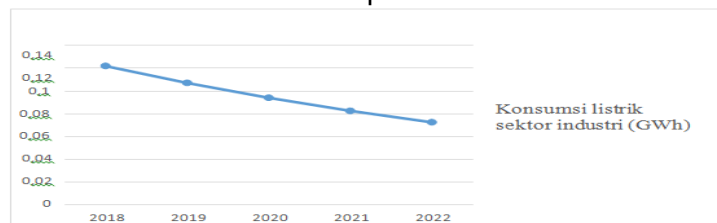
Gambar Grafik Prediksi Kebutuhan Energi Listrik Sektor Industri Area Kota Parapat Kabupaten Simalungun Tahun 2018-2022

From the figure it can be seen that the consumption of electrical energy in the industrial sector in 2013 was 233,963 kWh and in 2017 was 140,818 kWh, which decreased by 93,145 kWh. And it can be seen that the average decrease in electrical energy consumption in the industrial sector per year from 2013 to 2017 is around 18,629 kWh or around 11.45% per year. And when compared with the data obtained from the Simalungun Statistics Agency, as shown in the table below, the industrial growth rate has indeed experienced

decline.

Table of Industrial Sector Growth Rates

SUBLAPANGAN USAHA		2013	2014	2015	2016*	2017**
(1)		(2)	(3)	(4)	(5)	(6)
Peranan		100,00	100,00	100,00	100,00	100,00
1	Industri Makanan dan Minuman	64,48	64,89	66,96	68,50	69,18
2	Industri Karet, Barang dari Karet dan Plastik	32,98	32,63	30,55	29,02	28,44
3	Industri Barang dari Logam, Komputer, Barang Elektronik, Optik dan Peralatan Listrik	0,66	0,63	0,62	0,61	0,60
4	Lainnya	1,89	1,85	1,87	1,86	1,79
Laju Pertumbuhan		3,40	3,28	2,83	4,70	4,44
1	Industri Makanan dan Minuman	4,63	4,75	5,78	6,48	4,14
2	Industri Karet, Barang dari Karet dan Plastik	0,79	-0,01	-4,22	0,10	5,46
3	Barang dari Logam, Komputer, Barang Elektronik, Optik dan Peralatan Listrik	1,01	2,49	3,07	3,21	-0,11
4	Lainnya	2,74	2,33	3,06	3,64	3,74

* Angka sementara
** Angka sangat sementara

And from Figure 4.13 it can be seen that the predicted consumption or demand for electrical energy in the industrial sector in 2018 is 122,029.59 kWh, which has decreased by 18,789 kWh from 2017, and will continue to decrease to 72,496.85 kWh in 2022, so the prediction the decrease in the demand for electrical energy in the industrial sector from 2018 to 2022 has decreased by 49,532.79 kWh. And it can be seen that the predicted average industrial demand for electrical energy per year to fall from 2018 to 2022 is 9,906.55 kWH or a decrease of around 12.2% per year.

So it can be seen that the need for electrical energy in the industrial sector in the Parapat City area, Simalungun Regency from 2013 to 2022 has decreased when compared to the other three sectors, namely 161,466.15 kWh, so it can be seen that the average decrease in the need for electrical energy in the industrial sector per year from 2013 to 2022 is 16,146.62 kWh per year. And based on data from the Simalungun Statistics Agency, the industry growth rate has slowed down compared to the previous year.

Laju pertumbuhan industri pengolahan tahun 2017 sebesar 4,44 persen, melambat dibandingkan tahun sebelumnya yang bernilai 4,70 persen. Dibandingkan dengan tahun-tahun sebelumnya, pertumbuhan tahun 2015 yang paling kecil.

Grafik 4.2 Peranan dan Pertumbuhan Lapangan Usaha Industri Pengolahan, 2013-2017 (Persen)

Figure Graph of Processing Industry Business Field Growth 2013-2017

From the description above, the industry in question is an economic activity that processes raw materials, raw materials, semi-finished goods, and finished goods into goods with a higher use value, including industrial design and engineering activities. Meanwhile,

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if it is related to the title of this final project which is related to National Tourism, then the industry should also be a tourism industry.

The tourism industry is an industry that generates economic value from tourism activities. It can take the form of: art and cultural tourism (for example: art and cultural performances), educational tourism (for example: heritage, architecture, natural observation tools, and geology museums), nature tourism (for example: natural scenery on beaches, mountains, plantations , and forestry), and city tours (for example: seeing government centers, shopping centers, shopping areas, restaurants, hotels, and entertainment venues).

Until now the Lake Toba KSN area has not fulfilled this definition so that it cannot be calculated how much electricity is needed in the tourism industry sector. Therefore the value of electricity demand in the industrial sector should not decrease but increase.

Graph Analysis of Total Electrical Energy Consumption
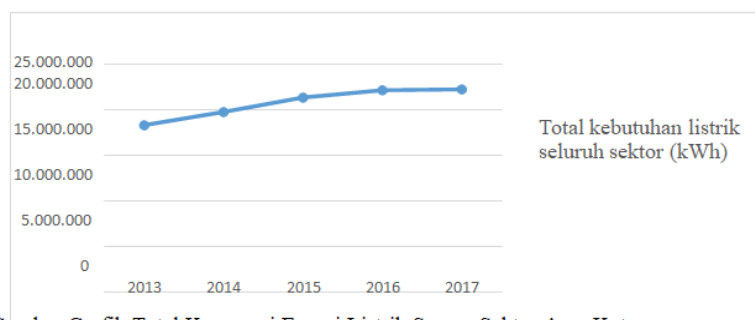
Gambar Grafik Total Konsumsi Energi Listrik Semua Sektor Area Kota Parapat Kabupaten Simalungun Tahun 2013-2017
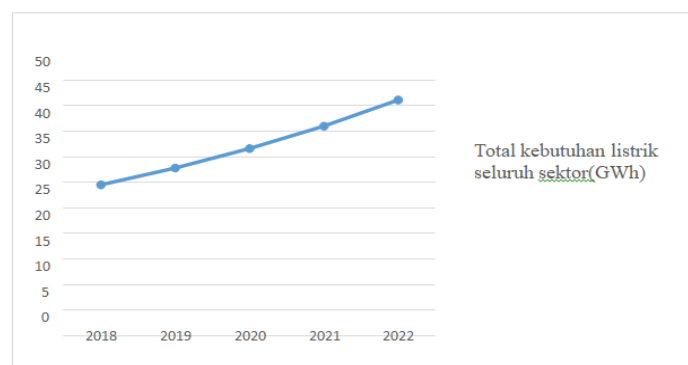
Gambar Grafik Prediksi Total Konsumsi Energi Listrik Semua Sektor Area Kota Parapat Kabupaten Simalungun Tahun 2018-2022

From the figure it can be seen that the total consumption of electrical energy for all sectors in 2013 was 18,372,330 kWh and in 2017 was 22,311,374 kWh, which experienced an increase of 3,939,044 kWh or around 3.9 GWH. And it can be seen that the average growth in total electricity consumption in all sectors per year from 2013 to 2017 was around 787,808 kWH or around 0.78 GWH or around 5.02% per year.

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And from the figure it can be seen that the predicted total consumption or total demand for electrical energy for all sectors in 2018 is 29,543,188.55kWh which has increased by or around 7,231,814.55 kWh or around

7.2 GWH from 2017, and will continue to increase to 46,149,759.61 KWh or around 46.1 GWH in 2022, so the predicted growth in total electricity demand for all sectors from 2018 to 2022 has increased by 16,606,571.06 kWh or around 16.61 GWH. And it can be seen that the predicted average growth in total electricity demand for all sectors per year from 2018 to 2022 is around 3,321,314.2kWH or around 3.32 GWH or around 11.8% per year.

So it can be seen that the total demand for electrical energy for all sectors in the Parapat City area, Simalungun Regency from 2013 to 2022 has increased quite a lot, namely 27,777,429.61 kWh or around 27.7

GWH, this amount is equal to two and a half times the total amount of electricity demand from the initial year of observation, so it can be seen that the average growth in electricity demand for all sectors per year from 2013 to 2022 is

2,777,742.96 kWh or around 2.77 GWH per year. From these data we can see that the total predicted amount is equal to two and a half times the total amount of electricity demand from the initial year of observation compared to the current supply which is no longer sufficient.

CLOSING

Conclusion

1. The results of forecasting or forecasting the growth of electricity loads using the econometric method in the PLN area served by PLN in Parapat City, Simalungun Regency from 2018-2022 always experience an increase, with an average growth of 7.55% (household), 21.45% (commercial) , 3,

    62 % (public), and - 12, 2% (industry) per year. In 2021 the total electricity consumption has reached 46,149,759.61 KWh or around 46.15 GWH which has increased to around 106.84% from 2017.

2. Although the highest average growth is commercial and household consumption, the largest electricity energy is the household sector where the consumption of the household sector is almost always above 70% of the total consumption each year and the smallest consumption of electrical energy is the industrial sector where the consumption of the industrial sector is always below 1% of total consumption each year.

3. From the research results, long-term forecasting or forecasting of the total consumption of energy needs in the LAKE TOBA NATIONAL STRATEGIC AREA served by PLN Parapat can be formulated using the equation

    Y = 37240431.52 + 4141342.31 X.

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Suggestions and Acknowledgments

1. From the results of the research that has been carried out, it can be seen that the need for electrical energy in the Lake Toba National Strategic Area is no longer sufficient in the next five years, even in the coming year it is already worrying.

2. Based on the forecast results, PLN should have planned earlier to build new generating centers by exploring the existing natural resources in Simalungun Regency because Simalungun Regency also has many fast-flowing rivers, quite a lot of geothermal potential that can be utilized as a power plant. , because in the coming years the power generated will no longer meet the requirements to meet customers' electrical energy needs.

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