YANGON UNIVERSITY OF ECONOMICS
DEPARTMENT OF APPLIED ECONOMICS
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STUDY ON ROLE OF ELECTRICITY PRICE IN RESIDENTIAL ELECTRICITY CONSUMPTION (CASE STUDY IN KALAW)

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EMPA – 30 (19th BATCH)

JULY, 2024

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This is to certify that this thesis entitled "**Study on Role of Electricity Price in Residential Electricity Consumption (Case Study in Kalaw)**", submitted in partial fulfilment towards the requirements for the degree of Master of Public Administration has been accepted by the Board of Examiners.

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ABSTRACT

Since electricity is a necessity and is essential to modern civilization, its consumption is rising quickly. The power sector in Myanmar is encountering numerous obstacles. In particular, the government is facing a lot of issues due to the widening power supply-demand gap. This study uses descriptive method by employing both primary and secondary data. It is found that the electricity consumption of respondents does not change notably although the electricity charges are increased. However, the respondents say that they are not satisfied with electricity availability. It is suggested that the government supports about electricity prices such as subsidies, energy efficiency programs, renewable energy investments are necessary.

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LIST OF ABBREVIATIONS

ADB	Asian Development Bank
AMI	Advanced Metering Infrastructure
ASEAN	Association of Southeast Asian Nations
CCGT	Combined Cycle Power Plant
CO2	Carbon Dioxide
DEPP	Department of Electric Power Planning
DHPI	Department of Hydropower Implementation
DPTSC	Department of Electric Power Transmission and System Control
EPGE	Electric Power Generation Enterprise
ERC	Electricity Regulatory Commission
ESE	Electricity Supply Enterprise
FEC	Final Energy Consumption
GWh	Gigawatt Hour
HH	Household
HPGE	Hydropower Generation Enterprise
IEA	International Energy Agency
JICA	Japan International Cooperation Agency
KV	Kilovolt
kWh	Kilowatt Hour
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
MESC	Mandalay Electricity Supply Corporation
MMk	Myanmar Kyat
MOEP	Ministry of Electric Power
Mtoe	Million Tons of Oil Equivalent
MVA	Megavolt Ampere
MW	Megawatt
NEP	National Electrification Plan
RTP	Real Time Price
SAP	Standard Assessment Procedure
SMEs	Small-To-Medium-Sized Enterprises

TOU	Time-Of-Use (Tariff)
TPES	Total Primary Energy Supply
TWh	Terawatt-Hours
UNFPA	United Nations Population Fund
USD	United States Dollar
YESC	Yangon Electricity Supply Corporation

CHAPTER I
INTRODUCTION

1.1 Rationale of the Study

Electricity is one of science's most important discoveries, dramatically changing the way of life. The movement of charge is simply referred to as electricity. It is an essential part of modern society. Electricity is utilized in a variety of applications, including lighting, cooling, and heating, as well as to power or drive electrical equipment and machines. Electricity facilitates growth in the economy, and it is a well-known fact that electricity is necessary to daily living; without it, life would be boring both at home and at work. Electricity not only plays an essential role in our daily lives at home, but it is also critical for everything that happens in the world around us in our modern lives, such as industry that we rely on and communication in the form of radio, television, email, the Internet, and so on. A further sector of our daily lives that is influenced by electricity is transport. Electricity benefits people in a variety of ways, including household purposes (such as heating, cooking, lighting, and washing), agricultural efficiency and productivity, medical uses, educational development, communication sector, transportation, communication, and entertainment, industrial growth, energy and nature conservation, easy conversion to other forms and generation, and many more. The manufacturing process is simple, dependable, and inexpensive, with rapid technological growth in which electricity plays a key role. Both transmission and distribution system operators could benefit from using the distribution grid's flexible resources.

One of the most important requirements for a nation's economic development, growth, and income distribution is having a sufficient capacity to produce energy (ADB, 2015). The IEA (2015) reports that annual per capita electricity consumption in the regions of South and East Asia is currently growing at a particularly high rate (5%) at a time when it is nearly stable in industrialized regions like Western Europe (0.1%) and North America (0.3%) where considerable efforts have been made over the last few

decades to control energy consumption. Understanding the factors that influence energy consumption is necessary to create a realistic strategy for the production and distribution of power (Filippini and Pachauri, 2002; Athukorala and Wilson, 2010). Furthermore, these plans should be grounded in empirically supported data regarding consumer reactions to fluctuations in energy costs, the extent of direct subsidies obtained by consumers, income, the cost of linked goods, and other pertinent socio-economic factors.

Specifically, the real-world behavior of consumers, whose lifestyles are changing, and their responses to price increases or subsidies are not taken into consideration in these planning materials. Knowledge of power-saving technologies and other potential factors that could encourage needless power usage at the household level should also be taken into consideration. Government policies also do not prioritize the development of power-saving practices and habits, nor do they promote the effective use of electricity. Pricing for electricity is a key tool for ensuring financial sustainability, increasing social equality, and boosting economic efficiency. The methods used to determine power pricing might differ greatly across the globe. Nonetheless, several nations utilize rising block tariff pricing, which uses a stepped volumetric charge.

The rate per unit of electricity increases as the quantity of usage increases when block tariffs are raised. Customers pay a similar price up to the limit of the second block and a lower rate up to the first consumption block, and so on, until they reach the highest block of consumption. Customers that purchase the highest block can use as much electricity as they like, but the cost of each extra unit they use is determined by the highest rate structure. Rising block tariffs are by far the most popular way to charge for electricity, and in the majority of nations, policymakers use this pricing mechanism to regulate how much electricity is consumed. But even with hidden and indirect subsidies, some consumers benefit from the increasing block rate structure (Reiss and White, 2005; Mirnezami, 2014). Depending on the volume of consumption in this instance, various consumers may receive varying quantities of subsidies. Furthermore, because their monthly consumption level varies, the same consumers may receive a varied amount of subsidy in different months a factor (Athukorala, et al., 2019).

To better convey the seriousness and complexity of selecting the appropriate suite of policy tools, the current debacle called the "energy crisis" might be better characterized as a "energy policy crisis." The focus of study has been on predicting the

supply elasticity of primary consumption, especially residential usage, until recently. While these are important problems for long-term policy, the current petroleum product shortages highlight the importance of the need for alternative energy sources and the possibility of fuel substitution in the near future. Consumers of electricity can probably replace the usage of electricity with other items, either energy-related or not, in reaction to shifts in prices and technological advancements (Griffin, 1974).

1.2 Objectives of the Study

The objectives of this study are:

(1) To identify the key factors of the quantity of electricity consumed by residential consumers in Kalaw Township across all household income levels.

(2) To determine efficient ways of using electricity to meet reasonable price ranges of residential consumers in Kalaw

1.3 Method of Study

This study used cross sectional descriptive study design, to find the current role of price on electricity consumption in households use, explore electricity demand and supply in residential. Simple random sampling is used to select the sample respondents from each quarter in Kalaw. A total of 120 residential consumers were randomly selected. Both primary data and secondary data were used in this study. Primary data was collected from the survey method using a self-administered questionnaire and secondary data was obtained from corresponding Primary schools and published reports, journals, etc.

1.4 Scope and Limitation of the Study

This study was conducted in Kalaw Township in Southern Shan state. Most of the households that had more than 3 years of experience in consuming electricity were selected. Data collection was carried out from 2023 October to December 2023. This study was done residential consumption and did not involve commercial or industrial consumption. Moreover, the survey was conducted only Kalaw in township and its around villages of city.

1.5 Organization of the Study

This study is organized into five chapters. The introduction of the thesis, rational of the study and objectives of survey, describes methodology and scopes and limitations of the study are presented in Chapter One. Chapter Two describes the literatures of role of electricity price on household consumption from related paper, articles and textbooks. Chapter Three Overview of Current Electricity Distribution System in Myanmar. Chapter IV points out the Analysis on role of Electricity Price in Household Electricity Consumption in Kalaw. Finally, Chapter V ends with the summary of the findings and discussion, suggestions and needs for further research on this study.

CHAPTER II
LITERATURE REVIEW

2.1 Importance of Electricity in Daily Household Lives

Given all the way that electricity is used in people's daily lives, its significance was obvious. To conveniently cook or clean, it is employed in most kitchen appliances. When cooking, electricity provides us with comfort and convenience, unlike the traditional method. The energy that is held in particles when a force acts upon them to cause an electrical charge is known as electricity. Electricity is required in big quantities for many household tasks on a regular basis. It is used for transportation, industrial machinery, air conditioners, refrigeration, lighting, and household appliances. These are a few significant ways that electricity is used in daily life.

Lighting: Probably the most common and ancient application of electricity was for lighting our surroundings. Electric lights powered by incandescent bulbs, fluorescent tubes, and an abundance of other lighting systems provide illumination for mass locations such as houses, streets, businesses, and public areas. Many lighting systems, including LED lights, fluorescent tube lights, incandescent bulbs, and more, rely on electricity in the residence or business.

Heating and Cooling: Electric water heaters are the most often used appliances for heating; baseboard heaters, electric furnaces, and electric water heaters are all powered by electricity. It powers the compressors in the freezers, refrigerators, and air conditioners, which chill the room and keep food fresh. This is the area where heating and cooling appliances use electricity.

Cooking and Home Appliances: One of the most important needs for any household is electricity. Heating systems, as well as a range of appliances like refrigerators, washing machines, dishwashers, and microwaves, are all powered by electricity. Whether making recipes in a microwave, toaster, or mixer grinder, or preparing meals for others, electricity is a necessity.

Entertainment Devices: Televisions, sound systems, game consoles, and other devices that give people fantastic experiences and a means of relaxation are all powered

by electricity. Electricity's significance surpasses that of any other invention. This is because its discovery, invention, and practical application in daily life have spawned numerous other inventions and modernizations; in fact, the existence of electricity in our lives has enabled the technological revolution.

The movement of electrical power or charge is known as electricity. One of the most extensively utilized energy sources and a fundamental component of the natural world is electricity. Since it is created by transforming primary energy sources like coal, natural gas, nuclear, solar, and wind energy into electrical power, the electricity we use is a secondary energy source. Another name for electricity is an energy carrier, which indicates that it could transform into different types of energy like heat or mechanical energy. While our primary energy sources can be either renewable or nonrenewable, the electricity we utilize is neither.

Few people take time to imagine what life would be like without electricity, even though it is a need in most everyday situations. People often take electricity for granted, just like they do air and water. Nonetheless, individuals utilize energy on a daily basis for a variety of purposes, such as computer and television powering and home heating and cooling. About a century ago, before electricity became widely available, heat was given by wood-burning or coal-burning stoves, food was kept cold by iceboxes, and light was provided by candles, whale oil lamps, and kerosene lamps. Since the 1600s, researchers and innovators have endeavored to comprehend the fundamentals of electricity. Notable advancements in our comprehension and application of electricity can be attributed to Nikola Tesla, Thomas Edison, and Benjamin Franklin.

2.2 Income, Price, and Household Size on Residential Electricity Consumption

Regarding overall energy consumption and electricity demand in particular, households are quite significant. Reductions in the demand for electricity have traditionally been supported based on energy security and the environment, even though it is a necessary product for our everyday lives. Family size, climate, ownership of appliances, way of life, the physical characteristics of a home, and energy-related behavior all affect how much energy is consumed domestically (Schipper et al., 1982, Mullaly, 1998, Palmborg, 1986, Brandon and Lewis, 1999, Baxter et al., 1986). Building energy efficiency is increasing; as a result of better thermal insulation and better construction, the average Standard Assessment Procedure (SAP) rating (BRE,

2009) of homes is increasing and will do so until heat transfer is limited. Climate, infiltration, insulation, heating system efficiency (which depends on the kind of boiler and fuel), floor space, direction, glazing type, age of the house, and construction type all affect a home's thermal and energy performance.

It is generally anticipated that rising prices will result in a drop in residential electricity consumption. On the other hand, if income growth is at least equal to the pace of price rises for electricity, consumption of that energy can also rise. Electricity use was higher in households with higher incomes, larger households, and more senior people. Larger housing areas, houses with more appliances, owner-occupied, multi-floor residences, and homes used for business purposes were among the characteristics of dwellings that contributed to increased household electricity consumption. Identifying populations that tend to use more electricity is a good way to implement strategies for lowering electricity consumption. According to multiple studies, small-sized and low-income households might utilize more electricity overall. Therefore, when household sizes decreased the rise in per capita consumption of electricity caused by these changes ought to raise a few concerns (Yalcintas & Kaya, 2017).

Convenient form: Compared to other forms of energy, electrical energy is a very convenient form of energy because it can be easily converted from one form to the desired form of energy. For example, if we need to convert electrical energy into heat energy, we only need to pass the electrical energy through a high resistive wire, such as a heater. Similarly, if we want to convert electrical energy into light energy, we will use an electric bulb.

Easy control: Controlling and operating electrically powered machinery is extremely simple and convenient. For example, an electric motor can be started or stopped by just flipping a switch. Similarly, using a simple design, users can control the speed of an electric motor throughout a specific range.

Flexibility: The most crucial feature contributing to electrical energy's supremacy over other sources of energy is its flexibility. It may be simply moved from one site to another using conductors.

Less expensive: Of all energy sources, electrical energy is the most cost-effective. It is significantly less expensive than alternative energy sources. It has a wide range of applications, including home, industrial, and commercial.

For households of all income levels, the level of electricity efficiency is already comparatively high. Furthermore, one feature of dwellings (the number of rooms) and

two features of households (their size and the educational level) are relevant drivers of household efficiency in electricity consumption. Whereas the educational level and household size negatively affect electricity efficiency, the number of rooms positively influences efficiency. A few variables, both economic and non-economic, are considered, such as dwelling qualities, income, and household characteristics. According to some research, many residences across every socioeconomic class currently have rather high levels of electricity efficiency (Romero-Jordán, 2022).

Both the size and the income of the household were significant in every quantile for every year. Some researchers identify the characteristics of homes with excessive electricity use. Electricity use was higher in households with higher incomes, larger households, and more senior individuals. Larger housing areas, houses with more appliances, owner-occupied, multi-floor residences, and homes used for business purposes were among the characteristics of dwellings that contributed to increased household power usage (Huang, 2015).

2.3 Household Electricity Consumption

Electrical appliances' power ratings are expressed in watts (W) or kilowatts (kW). One thousand watts makes up one kilowatt. A one kW device will use one kWh (kilowatt hour) of power to run for one hour. Electricity is measured in kWh units, and the cost of a unit is displayed in cents per kWh. Different brands and models of household equipment use different amounts of electricity. The following formula can be used to determine the appliance's operating costs if people know the appliance's power rating and the supplier's electricity unit pricing. The following formulas are used to calculate the appliances:

Appliance running cost (p/hr) = Power rating (W) x Electricity unit rate (p/kWh) ÷ 1000

Some appliances, such as tumble dryers and washing machines, have different power consumption depending on how long devices are used, so this data is divided into a different table that displays the average cost per cycle with a full load.

Table (2.1) Kitchen Appliances

Appliances	Watts
Refrigerator	300 -1000
Freezer	300 – 700
Garbage Disposal	700
Microwave	800 – 1000
Electric Oven	2000 -5000
Stove	3000
Dishwasher	1200 -1400
Blender	500 -700
Toaster	800 - 1500
Toaster Oven	1200 - 1400
Drip Coffee Machine	550 - 1200
Single – Sever Brewer	900 - 1500
Electric Kettle	1500
Electric Hand Mixer	200
Deep Fryer	1000
Air Fryer	800-1800
Slow Cooker	400
Instant Pot	700 -1200
Rice Cooker	400
Ice Marker	90
Bread Maker	500-1500
Juicer	400-1000
Food Processor	500-1200

Source: https://blog.ecoflow.com/us/how-to-calculate-kwh-usage/

Table (2.2) Bathroom Appliance

Bathroom Appliance	Watts
Blow Dryer	800-1800
Curling Iron	150
Electric Shaver	6
Straight Iron	330
Electric Toothbrush	8-12

Source: https://blog.ecoflow.com/us/how-to-calculate-kwh-usage/

Table (2.3) Households Tools and Devices

Households Tools and Devices	Watt
Vacuum	450-3000
Lawn Mower	700-1800
Chain Saw	1200
Circular Saw	1200
Disc Sander	1200
Hedge Trimmer	450
Weed Trimmer	500
Edge Trimmer	500
Drill	720
CCTV Camera	2-15
Burglar Alarm	7-8
Humidifier	11
Dehumidifier	30-50
Air Purifier	8-56
Sewing Machine	750
Electric Blanket	100-150

Source: https://blog.ecoflow.com/us/how-to-calculate-kwh-usage/

Table (2.4) Heating and Cooling Appliances

Heating and Cooling Appliances	Watts
Central Air Conditioner	1000-3500
Window Air Conditioner	500-1400
Space Heater	1500
Fan Blower	12-600
Box Fan	50-200
Ceiling Fan	20-80
Electric Water Heater	1125-4000

Source: https://blog.ecoflow.com/us/how-to-calculate-kwh-usage/

Table (2.5) Light Appliances

Light Appliances	Watts
Incandescent Light Bulbs	60
LED Light Bulbs	10
1’ LED Light Strips	16
Incandescent C9 String Lights (25 Bulbs)	175
LED String C9 Lights (25 Bulbs)	60
Incandescent Mini String Lights (1000 Bulbs)	408
LED Mini String Lights (1000 Bulbs)	69

Source: https://blog.ecoflow.com/us/how-to-calculate-kwh-usage/

Table (2.6) Entertainment Appliances

Entertainment	Watts
Plasma TV	150-500
LCD TV	60-150
Video Game Console	160-200
Projector	150-800
Gaming Desktop Computer	300-500
Satellite Dish	20-30
Cable Box	35
DVD Player	15
Blu-ray Player	15
Stereo	8
Record Player	3

Source: https://blog.ecoflow.com/us/how-to-calculate-kwh-usage/

Table (2.7) Laundry Appliances

Laundry Appliances	Watts
Washer	400-1300
Electric Dryer	1800-5000
Gas Dryer	150
Clothes Iron	1100

Source: https://blog.ecoflow.com/us/how-to-calculate-kwh-usage/

Table (2.8) Home Office Appliances

Home Office Appliances	Watt
Standard Desktop Computer	<5
Laptop	<5
LCD Monitor	<5
Router	5-20
Printer	30-50
Paper Shredder	200
Copy Machine	300-500
Smart Phone Charger	5
Tablet Charger	12
Modem	2-20
Scanner	25

Source: https://blog.ecoflow.com/us/how-to-calculate-kwh-usage/

The appliances in a household that use electricity determine the quantity of electricity needed for those items. As is well known, the primary uses of electricity in the household are for lighting and powering equipment such as air conditioners, refrigerators, water heaters, kitchen appliances, televisions, music systems, etc. As per the World Bank report of 2008, lighting constitutes over thirty percent of most of household power use, with refrigerators, fans, electric water heaters, and televisions following closely behind. Standby power uses about four percent of the entire amount of electricity utilized in homes. The household sector now has more access to energy as a result of increased urbanization throughout time.

A household's consumption of home electronics and kitchen appliances has increased because of rising disposable income. In addition, as consumer spending power has grown, most households have adopted more energy-intensive lifestyles and used more electricity as a result. Rising incomes have driven and will continue to drive demand across consumer classes in India's rural and urban areas, according to McKinsey (2008). A household's electricity consumption is influenced by a few factors, including temperature, family size, dwelling size, and income, in addition to the growing number of electrical appliances and their use. According to Davis & Durbach (2010), it is important to distinguish between what is sometimes referred to as the amount of electricity consumed (also known as actual electricity consumption) and the

amount of electricity demanded (also known as apparent electricity consumption). Rather than measuring actual consumption, the former measures the consumption of services that use electricity. The latter calculates the real electricity consumption.

2.4 Overview of Electricity Pricing Policies on Residents' Electricity Utilizing

Understanding the advantages of residential use of dynamic tariffs requires removing adoption barriers for households, based on the supposition that overall efficiency gains exceed households' participation costs (Faruqui et al., 2010a). Charles River Associates (2005), looking primarily at time-of-use tariffs (TOU) in a cross-country analysis, discover that only a price ratio between peak and off-peak prices of 3:1 or greater will allow for significant gross cost savings to encourage households to adopt a dynamic tariff. Supply and demand in electrical grids must always be balanced (Ulbig et al., 2014). Dynamic electricity tariffs are commonly discussed as tools for demand-side management to ensure this grid stability (Dutta and Mitra, 2017). when price signals, consumers adjust their electricity consumption in response to over- or under-supply in the electrical grid, maintaining grid stability (Gelazanskas and Gamage, 2014) and lowering the expensive demand for peak-load capacity (Faruqui et al., 2010a). In line with this, Faruqui and Sergici (2013) demonstrated that price ratios play a significant role in influencing customers' load shifting behavior. Leautier (2014) also found that the marginal value of switching to RTP tariffs is directly correlated with price fluctuations. Furthermore, it was confirmed by Gottwalt et al. (2011) that larger price spreads in RTP tariffs result in larger financial savings.

According to economic theory, a kWh's price is considered economically efficient if it accurately represents the supply's short-run supply-side management (Borenstein and Bushnell, 2018). Nevertheless, this ideal level of sales of electricity is not usually achieved. Electric utilities must recover large portions of fixed costs that are not included in the marginal costs of production, while also having the ability to abuse their market dominance. However, as noted by Borenstein (2016), electricity prices usually do not internalize negative externalities. According to Borenstein (2016), in terms of efficiency and equity, two-part tariffs are the "least bad" solution to this problem. These two-part tariffs are made up of time-varying volume-based charges that cover the remaining portion of the system-wide fixed costs as well as the social marginal costs of provision (including externalities) and a fixed monthly fee that covers

all consumer-specific fixed costs and some system-wide fixed costs (Freiera & von Loessl, 2022).

According to the cost causality principle, consumers should pay for the exact expenses for which they are accountable. This rule is broken in a standard tariff since it represents the idea of economically efficient prices, where all costs are unaffected by fluctuating production and transmission costs. Nevertheless, prices that incorporate highly distinct regional features and fluctuate in real time may violate the principles of simplicity and transparency. The concept of cost recovery is primarily examined by Dupont et al. (2014) from the standpoint of the producer, where each actor is required to be able to recover their generation costs. This general rule, however, affects every aspect of price. Additionally, there are certain uses for taxes and surcharges that need funding. Therefore, the fundamental tenet of the cost recovery rule is that, regardless of any dynamics in the tariff design, the annual electricity bill must remain the same in the absence of a shift in consumption. Revenue neutrality is another name for this tariff feature (Faruqui and Sergici, 2010; Faruqui and Lessem, 2012).

These five rules are a bit conflicting, so it's important to figure out acceptable compromises. This is particularly true when considering utilities' concerns about revenue losses and non-recovery of implementation costs (Costello, 2004) in addition to households' risk aversion, which is demonstrated by their preferences for price caps (Schlereth et al., 2018). From the standpoint of both retail companies and customers, two-part tariffs are a reasonable approach, if equity concerns are taken into account. One on the other hand, revenue and bill stability are supported by the set monthly fees. However, according to Costello (2004), dynamic unit charges theoretically provide efficient prices at the margin. It contributes in multiple ways to the outlined literature, while concentrating on the consumption-based part of two-part tariffs that can have time-varying pricing. primarily outline a broad method for creating dynamic electricity tariffs that adheres to the guidelines established by Dupont et al. (2014) and is based on actual market data. This approach applies to German data, but it is directly applicable to cost structures in other electricity markets. Second, the price on the stock exchange need not be the foundation for the differences in prices. Actually, any appropriate variable, including residual loads or emission factors, can be used as an input in our method. By doing this, we address the potential conflict that may arise between carbon taxation and spot-market-based dynamic tariffs brought on by narrowing retail price spreads, as highlighted by Gambardella et al. (2019). Third, some research quantifies

the potential net cost savings for households by accounting for behavioral adaptation costs, following the lead of Gambardella and Pahle (2018). Furthermore, some papers evaluate the electricity demand and load shifting capacity of heterogeneous households. This enables us to assess the specifications needed to create dynamic tariffs, specifically the average short-term price differential that is required, and to determine the resulting policy implications. Fourth, it calculates the potential CO2 savings for each household, which can be a powerful argument in favor of electricity tariffs that vary over time (Freiera & von Loessl, 2022).

2.5 Review on Previous Studies

Jessore & Rapson (2014), who carry out a field experiment with a frame in the United States and find that long-term responsiveness to dynamic pricing leads to the development of conservation habits. Additionally, they demonstrate that households' price sensitivity is raised by roughly three standard deviations when they receive real-time feedback on their electricity consumption and current electricity prices. In numerous option applications incomplete knowledge about product attributes reduces efficiency. However, this can be mitigated by offering simple, inexpensive information. They investigate the impact of high-frequency data on residential electricity consumption on the price elasticity of demand through a randomized control trial. Price salience does not explain the three standard deviations increase in responsiveness of informed households to transient price increases. Beyond short- and medium-term pricing events, conservation also shows habit formation and suggests that the intervention reduces greenhouse gas emissions. Survey data indicates that knowledge encourages learning.

Nie & Zhang (2023), create a mechanistic framework to explain how the electricity price reform policy affects how people in urban and rural areas use electricity and assess how the policy's recommendations will reduce carbon emissions using information from a comprehensive household energy consumption survey conducted from January 2020 to May 2021. The study's findings indicate the following: (1) Compared to urban families, rural households use more electricity daily and do so more irregularly. On the other hand, urban people’s home power consumption is growing at a faster rate than rural residents. (2) Demand and comfort motives are the primary ways in which the energy price reform policy affects the home electricity consumption behavior of both urban and rural households. (3) With policy intervention, residence

energy consumption in rural areas will decrease more quickly than in urban areas, and household energy consumption in both areas will decrease more quickly before 2025 and subsequently stabilize.

Yalcintas & Kaya (2017), found that when prices rise, residential electricity consumption falls. On the other hand, if income rises at least as fast as prices, electricity consumption can rise along with them. We offered proof that Oahu and the other Hawaiian Islands' residential electricity consumption has been steadily declining in terms of both customers and per capita. Prior to the implementation of energy conservation measures in 2008, the decline in residential electricity consumption began in 2004, following a peak in usage. The findings also show that, in contrast to other States, Hawaii did not experience savings from reduced residential electricity use. Because the residents had to keep the electricity bill within their household budgets, there was a partial reduction in the amount of electricity consumed. The results of linear regression analyses show that there is no significant correlation between price and income as variables and residential electricity consumption across all islands. However, a significant correlation of coefficient is observed in Oahu when HHS is added as a variable in addition to income and price. In Arizona, California, Florida, and Texas, they found a very strong relationship between residential electricity consumption, income, and price.

In the study of Karisma, et al., (2016), it is focused on (1) examining the characteristics of the households influencing household electricity consumption. It was carried out in the city of Malang and examined the likelihood of each factor influencing, such as income, location, tariff prices, household size and member count, house size, voltages, home appliances, type of business, and the bill of payment for consumption demand electricity of non-business and business households. (2) Examine how Malang's non-business households' consumption differs from that of business households. (3) Examine the most important or influential factor influencing Malang City's business and non-business households' electricity consumption. The findings demonstrate that in Malang, factors such as simultaneous determination of income, location, house size, number of household members, voltages, home appliance type, type of business, and ability to pay demand had a noteworthy and favorable impact on the consumption of electricity by both business and nonbusiness households. However, based on a partial determination, the members of the household, the voltage, and the payment amount are the significant factors that affect the electricity consumption of

non-business households. Similarly, based on a partial determination, the factors that affect the significant factors that affect the electricity consumption of private households are the tariff, the voltage, the bill of payment, and the type of business household industries.

Tewathia (2014), the study title is “Determinants of the Household Electricity Consumption: A Case Study of Delhi” examines that the average monthly residence electrical usage for Delhi's summer, winter, and mild weather, as well as seasonal fluctuations in this consumption. Using a questionnaire-based study of 395 Delhi households chosen through stratified random selection, the factors influencing a household's energy use have been investigated. In order to characterize the pattern of residential power usage, multiple regression models were run. The study's findings indicate that the number of appliances a home owns has the biggest impact on the dependent variable's volatility. From the original data utilized in the study, a non-linear Temperature Electricity Curve with an inverted U shape has been generated.

CHAPTER III
OVERVIEW OF CURRENT ELECTRICITY DISTRIBUTION SYSTEM IN MYANMAR

3.1 Overview of Electricity Consumption in Myanmar

With a land area of 676,577 square kilometers (km) and a shared border of 5,858 km with Bangladesh and India to the northwest, China to the northeast, and Thailand to the southeast, Myanmar is the largest country in mainland Southeast Asia. The majority of the land is used for agriculture, with forests covering about 48% of the total land area. With an average annual population growth rate of 1.0% between 1990 and 2015, Myanmar's population stood at 56 million in 2019. With three different seasons, Myanmar is situated in the western region of the Indochina Peninsula. With three to four months of intense monsoon and plenty of sunshine all year round, it's the perfect place to store water for hydropower and farming. Numerous rivers, mountain ranges, and sedimentary basins with vast mineral reserves and energy resources are among its topographic characteristics. The 2,832 km coastline strip in the south and the delta regions where the two main river systems of the nation meet the Bay of Bengal are excellent places for the growth of marine ecosystems and a plentiful supply of marine goods and chemicals. Abundant natural resources are available in Myanmar to produce commercial energy. Now, Myanmar has access to coal, hydropower, biomass, natural gas, and crude oil as energy sources. Other possible energy sources include solar, geothermal, wind, bioethanol, biodiesel, and biogas. 542.56 million metric tons of coal, 5.56 trillion cubic feet of gas, and 105 million barrels of oil made up Myanmar's proved energy reserves in 2017. The nation exports significant amounts of coal and natural gas to its neighbors, making it a net exporter of energy in East Asia Energy Outlook and Energy Saving Potential. But almost 90% of its entire oil needs are imported.

Over the past decade, Myanmar's power sector has grown quickly, relying on hydropower and natural gas to supply the country's rapidly increasing electricity demands. By 2022, there will be 7,100 MW of installed generating capacity, up from over 2,800 MW in 2010. By December 2022, natural gas will have made up half of the

installed capacity (3,567 MW), with hydropower accounting for the remaining 45% (3,225 MW), ground mounted solar accounting. for 3% (192 MW), and coal accounting for 2% (138 MW). The baseload is now provided by natural gas-fired power stations, with hydropower handling the peak load during the day. Most of the nation's gas-based producing capacity, including its two LNG-to-power facilities, is located in the Yangon metropolitan region. Mandalay, Bago, Magway, Mon, Rakhine, and Ayerawaddy are home to the remaining ones. The states of Shan, Kayah, and Kachin are the main hubs for hydropower production; lesser units may be found in the hills of Bago, Magway, and Sagaing areas.

Table (3.1) Installed Capacity and Power Generation based on Fuel Category 2018-2019

Sr.	Fuel Category	Installed (MW)	Generation (GWh)
1.	Hydro Power	3,259	12,395
2.	Gas and steam	2,352	9,294
3.	Coal	120	
4.	Diesel	117	562
Total		5,848	22,298

Source: Ministry of Electrics Power, 2022

The total primary energy supply (TPES) of Myanmar was 20.12 million tons of oil equivalent (Mtoe) in 2017. The primary uses of natural gas are in industry and the generation of electricity. With 5,848 MW of installed generating capacity and about 22 terawatt-hours (TWh) of energy generated in 2018, Myanmar is a power-producing country. Hydropower generated 56% of the total electricity generated in the same year, with thermal power (coal, natural gas, and oil) accounting for 44%.

In 1990, fewer than 13% of Myanmar's electricity was generated by fuels other than hydropower and natural gas, which predominate. The government intends to reduce the percentage of oil and raise that of natural gas, coal, hydropower, and other renewable energy sources. Additionally, Myanmar intends to sell electricity generated by its hydroelectric dams to China and Thailand, among other neighbors. The annual plan of constructing power plants in Myanmar from 2018 to 2022 (Table 3.2) mostly focuses on gas-based power plants, including liquefied natural gas plants, with a small

amount of hydroelectric and solar power plants included as well. The nation now has 120 MW of installed capacity of coal-based power plants, which are not included in the annual plan (Myint, 2021).

Table (3.2) Annual Schedule for the Development of Power Plant Projects (MW)

No.	Project Name	2018	2019	2020	2021	2022
1.	Thahtone CCGT (World Bank)	118				
2.	MyinGyan CCGT (Sembcop)	225				
3.	Minbu Solar (Green Earth)		40	40	40	50
4.	Baelin Gas Energy (Rental)		135			
5.	Myingyan Gas Engine		90			
6.	Myanaung Gas Engine (Japan Grant)			20		
7.	Pahtoelon CCGT (JICA)			12		
8.	Ahlon LNG to Power (Toyo Thai)			356		
9.	Kyaukphyu CCGT (Sinohydro)			135		
10.	Melaunggyaing LNG to Power (Zhefu)				1390	
11.	Kanbauk LNG to Power (Total and Siemens)				820	410
12.	Ywama (W.B.) (gas)				150	75
13.	Upper Kyaingtaung (hydropower)				51	
14.	Upper Yeywa (hydropower)				280	
15.	Middle Paunglaung (Energize)					152
16.	Dee Dote (Andritz)					60
Total		**343**	**265**	**563**	**2731**	**747**

Source: Ministry of Electric Power, 2022

Following Table (3.3) provides a breakdown of the projected final energy consumption (FEC) for 2012. The relative consumption of the household sector and each economic sector is displayed in this chart. An estimated 12.2 million tons of FEC were produced in 2012. Because fuel wood is used for cooking, the home sector was the major energy consumer, accounting for 66% of FEC. In Myanmar, users of socioeconomic data frequently query the veracity and accuracy of historical information. According to an assessment by Ware and Clark (2009), there is a dearth of

reliable statistical data for Myanmar, and the data that is available is dubious. This is due to a number of things, including the government's restricted authority over some areas of the country, a lack of resources for data collection and analysis, and the manipulation of data for both internal and external use. Similar conclusions are reached by the United Nations regional Economic and Social Commission for Asia and the Pacific, which states that Myanmar is the country in ASEAN with the least capacity "to produce reliable and timely data even for the most basic statistics" (ESCAP 2007). There hasn't been much trust in the population statistics. The fact that the ADB assessed the population in 2012 to be 61.0 million while the World Bank estimated it to be 53.5 million shows the degree of uncertainty in the population number. This difference represents a 20% difference.

Table (3.3) Final Energy Consumption in Myanmar 2012 to 2030

Description	Final Energy Consumption (%)	
	2012	**2030**
Residential Rural	58%	34%
Commercial	13%	10%
Transportation	11%	17%
Residential Urban	8%	7%
Industry	6%	26%
Agricultures	2%	3%
Non-Energy	2%	3%

Source: (IDA, 2023)

A survey of 1,000 households, an energy-intensive industry study that included all major corporations, and a survey of about 100 small-to-medium-sized enterprises (SMEs), which included hotels, restaurants, and business organizations, were used to create the consumption benchmark data. With the use of this data, the precise consumption linked to the factors influencing energy consumption in each industry was estimated. Household (HH) energy consumption was employed for HH energy projection, and it compares favorably with worldwide benchmarks when measured on a kgoe per HH basis.

Table (3.4) Household Consumption of Electricity in Myanmar

No.	Year	Total Consumption (kWh-million)	Electrified Household		Per Capital Consumption (kWh/yr)
			No. of Household (Million)	Percentage	
1.	2012-2013	8441.04	2.63	28	141
2.	2013-2014	9795.09	2.91	31	163
3.	2014-2015	11,406.76	3.26	29	222
4.	2015-2016	13,550.267	3.70	34	263
5.	2016-2017	15,482.09	4.11	38	301
6.	2017-2018	17,251.91	4.34	40	335
7.	2018 (April-Sept)	9,573.474	4.62	42	186
8.	2018-2019 (Oct-Sep)	19,478.05	5.14	47	378
9.	2019-2020 (Oct-Sep)	20,044.35	6.16	57	389
10.	2020-2021 (Oct-Sep)	19,369.67	6.64	61	356
11.	2021-2022 (Oct-Mar)	8,708.26	6.80	62	169
12.	2022-2023 (Apr-May)	17,183.55	7.15	66	334
Total Household			10.877		

Source: Ministry of Electric Power, 2022

By 2040, the aggregate final energy consumption (TFEC) of Myanmar's commercial buildings, transportation, industry, and households is expected to rise by 3.0% annually. By 2040, oil will rise by 4.9% annually and electricity will rise by 7.0%. By 2040, the total primary energy supply (TPES) will rise at a rate of 3.5% annually.

3.2 Background and Function of ESE

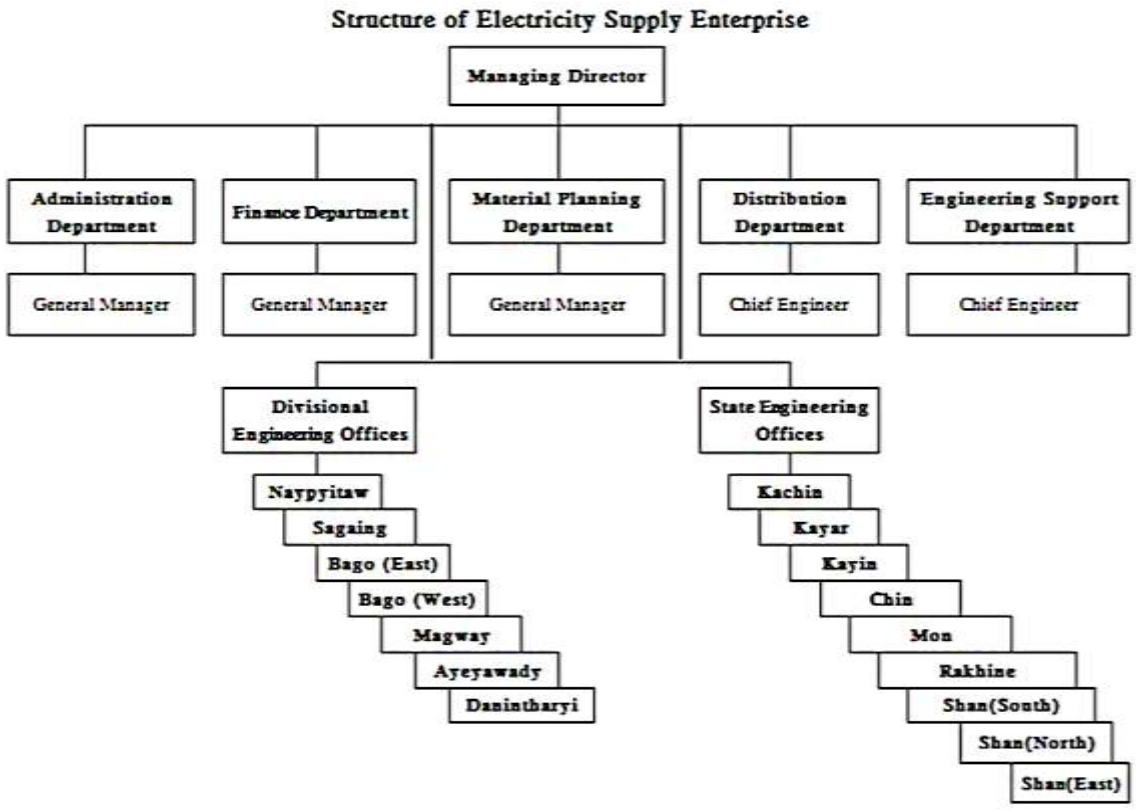
The Ministry of Electric Power No. 1 and the Ministry of Electric Power No. 2 were created out of the State Peace and Development Council's 2006. The major duties of the Ministry of Electric Power No. 1 include large-scale hydro power project implementation, selling electricity to the Ministry of Electric Power No. 2 and maintaining and operating the current hydro power plants. The scope of the activity includes installing new gas-fired power plants, selling electricity to end customers, and

maintaining the gas-fired power plants that are currently in place. Ministry of Electric Power No. 2 is the Ministry of Electric Power No. 1's exclusive buyer.

These two Ministries were merging to form the Ministry of Electric Power in September of 2012. The Ministry of Electricity and Energy (MOEE) was established on April 1, 2016, following the merger of the MOEP and the Ministry of Energy. In May 2022, the State Administration Council divided MOEE into the Ministry of Electric Power (MOEP) and the Ministry of Energy (MOE), marking the division of the ministry after six years. The following is the MOEP organizational structure:

1. Department of Electric Power Planning (DEPP)
2. Department of Electric Power Transmission and System Control (DPTSC)
3. Department of Hydropower Implementation (DHPI)
4. Electric Power Generation Enterprise (EPGE)
5. Electricity Supply Enterprise (ESE)
6. Yangon Electricity Supply Corporation (YESC)
7. Mandalay Electricity Supply Corporation (MESC).

Figure (3.1) Structure of Electricity Supply Enterprise



Source: Ministry of Electric Power, 2022

Figure (3.1) shows the structure of Electricity Supply Enterprise (ESE) and there is nothing else unaffected by electricity, according to the rapidly rising level of modern existence. Enhancing the areas of electric power generation, transmission, and distribution is therefor Before Myanmar's independence, power distribution served two purposes. Colony System Governance was the first, and Private was the second. Following the era of independence, the 1948 Act was characterized as only executing the electricity distribution sectors by the Government. Under the Ministry of Industry, the Electricity Supply Board (ESB) was established in 1951. Electricity Supply Board became Electricity Power Corporation on March 16, 1972. On April 1, 1975, the Ministry of Industry was reorganized into the No. 1 and No. 2 Ministries of Industry. Electricity Power Corporation was a part of the No. 2 Ministry of Industry at the time. The Ministry of Energy was established as the No. 2 Ministry of Industry on 12.4.1985. Under the Ministry of Industry, Electricity Power Corporation is reorganized as Myanmar Electric Power Enterprise.

On November 15, 1997, the Ministry of Electric Power was established in place of the Ministry of Energy. The Ministry of Electric Power consisted of one business and two departments. These are the Department of Hydro Power, the Department of Electric Power, and the Myanma Electric Power Enterprise. The Ministry of Electric Power was restructured into the Ministries of Electricity No. 1 and No. 2. The Ministry of Electric Power No. 2 had the subsequent four departments: Department of Electric Power (DEP), Myanma Electric Power Enterprise (MEPE), Electricity Supply Enterprise (ESE) and Yangon Electricity Supply Board (YESB). On September 5, 2012, Ministry of Electric Power Nos. 1 and No. 2 amalgamated to form the Ministry of Electric Power. On March 17, 2016, the Ministry of Electric Power and the Ministry of Energy were reformed to become the Ministry of Electricity and Energy.

The Function of Electricity Supply Enterprise

The following are examples of the strategies and objectives being implemented by the ministry regarding electricity distribution:

- The Department of Electric Power Planning is continually gathering and listing the facts and statistics related to our enterprise for the short- and long-term objectives.
- Hydropower plants, gas turbine plants, and other power plants that are not connected to the power grid are implemented and maintained.

- The Department of Electric Power Transmission and System Control purchases electricity; otherwise, power trade with adjacent nations continues.

Electricity is sold to the civilian population, as well as to commercial and state-owned businesses, industrial zones, and industries.

3.3 Determinants of Electricity Price in Myanmar

The demand for electricity in Myanmar has increased significantly recently, placing pressure on the country's outdated and inadequate infrastructure. In Myanmar, the use of electricity dates to 1908. Following the country's 1948 declaration of independence, the government made a big move in 1951 when it established the "Electricity Supply Board (ESB)," so beginning a state monopoly over utilities. In the seven years since Myanmar started economic reform and opened its market in 2012, the country has seen both a high rise in energy consumption and quick economic growth, with an average annual growth rate of about 7%. However, Myanmar has the least favorable energy access in all of ASEAN, and there is a huge unmet demand for home electricity. In 2000, the total amount of power consumed was 3,268 GWh. The industrial sector made up 40% of the overall consumption, and the residential sector made up 42%. With a percentage of 16%, the services sector took the majority, with other sectors accounting for the remaining 3%.

Myanmar's overall power consumption increased to 15,365 GWh by 2016, a 10.2% average annual growth rate. Compared to the residential sector, which had an increase in consumption of 11.3% annually, the industrial sector experienced a weaker annual growth rate of 8.3%. In 2019, the total number of residences consuming power was 10.877 million. Of these, 4.289 million (or 38.4%) had access to electricity, meaning that 6.588 million households were still without a consistent source of electricity.

About 40% of households are currently electrified, meaning that 60% of them are not yet connected to the national grid. Rather than relying on conventional solutions, these households are turning more and more to solar home systems and diesel generators. Of the 482 towns, about 350 have access to electricity, while the remaining 132 require electricity supplies. About 32,228 of the 63,737 villages have access to power, while the remaining 31,509 still require electrical supplies. In terms of user conditions, in 1988 0.6 million homes (10.7% of all households) had access to electricity through a home-use meter. This represents 0.6 million households out of 5.59

million households. Out of the 8.3 million homes, 2.1 million had access to electricity via a home-use meter in 2016. The table displays this data.

Table (3.5) Electricity Generation, Consumption and Demand in the Summer and Rainy Season in 2013

Subject	Summer Season (MW)	Rainy Season (MW)
Electricity Generated by Hydro Power Plants and Coal Fired Power Plants	1315	1552
Electricity generated by Gas – Based Power Plants	373	381
Total Electricity generation	**1688**	**1933**
Electricity Consumption	2060	1914
Necessary/ Surplus Electricity	(-) 372	(+) 19
Percentage of Electricity supply	81.94%	100.99%

Source: Ministry of Electric Power, 2022

Before 1988, Myanmar had a 10.6% electrification rate; by 2009, it had increased to 23.2%, and by 2012–2013, to 29%. In order to increase the electrification rate, the Ministries of Energy and Electric Power want to do so to 45% by 2020–2021 and 60% by 2025–2026. With approximately 180 kWh of power consumed per person, Myanmar has substantially lower per capita electricity consumption than its surrounding nations.

Table (3.6) Per Capita Electricity Consumption in Neighboring Countries

Country	Electricity Consumption (%)	Per Capita Electricity Consumption (kWh)
Bangladesh	41.0%	252
P.R.C	99.5%	2631
Cambodia	24.1%	131
Indonesia	64.6%	590
Malaysia	99.5%	3614
Thailand	99.4%	2045
Vietnam	97.7%	918
Myanmar	30.0%	180

Source: National Energy Policy, 2014

In 2012, 29% of Myanmar's population had access to the country's electrical grid, while 16% got their electricity from it. Myanmar uses the least amount of energy among the nations of Southeast Asia due to its poor infrastructure, low per capita income, and limited access to the electric power grid. Due to geographic and economic disparities, there are variations in the supply of electric power. For example, in May 2013, the generation of electricity in Yangon City was 75%, compared to 70% in the NPT, 44% in Kayah State, and 37% in the Mandalay Region.

Hydro and natural gas turbine generating make up most of the generation mix in the Myanmar power system. Table (3.7) lists the various forms of electricity generation costs per unit, including fixed and variable costs. Natural gas generation is the most expensive, while hydro power generation is the least expensive. In the Myanmar electricity system, production costs average 163 MMk per kWh, or $0.08 USD per kWh.

Table (3.7) Electricity Generation Cost per Unit in Myanmar Power System

No.	Type	Unit Generation Cost		Remark
		USD/ kWh	MMk/ kWh (1USD = 2100 MMK)	
1.	Hydro Power	0.05	105	average electricity generation cost of power plants at connection points
2.	Natural Gas	0.12	252	
3.	Solar	0.07	147	
4.	Coal Fired	0.07	147	

Source: Ministry of Electric Power, 2022

The gas-fired power plants in the above table have a generation cost of 0.12 USD/kWh and use domestic gas supplies to produce electricity. In Myanmar, the cost of selling electricity is determined by a step-up structure and progressive tiered tariff rate. The breakdown list is displayed in Table (3.8) and increases in tandem with rising consumption or billing units.

Table (3.8) Electricity Tariff Rate per Unit in Myanmar

Sr.	Types of Consumers		Unit Range (kWh)	Kyat/Unit
1	Domestic Consumption	Residential homes, Religious Building	1-30	35
			31-50	50
			51-75	70
			76-100	90
			101-150	110
			151-200	120
			>201	125
2	Non-domestic Consumption	Companies, Industries, Embassies and International Organizations	1 to 500	125
			501 to 5000	135
			5001 to 10,000	145
			10,001 to 20,000	155
			20,001 to 50,000	165
			50,001 to 100,000	175
			>100,001	180

Source: Ministry of Electric Power 2019

The rate for residential homes and religious buildings is MMK 35 per unit, but only for a maximum of 30 units. Customers will be assessed MMK 50 for units 31–50, MMK 70 for units 51–75, MMK 90 for units 76–100, MMK 110 for units 101–150, MMK 120 for units 151-200, and MMK 125 for units exceeding 201. Businesses and industries that consume up to 500 units are charged MMK 125 per unit; after that, the tariff rises by MMK 10 for every additional 500 units consumed, 10,000 units, 20,000 units, 50,000 units, and 100,000 units. MMK 180 is charged per unit to establishments that use more than 100,000 units.

Regarding its ability to remain financially sustainable, Myanmar's power sector faces the following obstacles: (a) a significant increase in the cost of electricity supply due to the higher cost of gas for electricity generation; (b) electricity tariffs below the cost of supply; (c) significant losses in transmission and distribution, which account for roughly 19% of the total amount of electricity produced; and (d) a significant need for investment in new power generation, transmission, and distribution assets.

3.4 Electricity Policy and Related Law in Myanmar

The 1984 Electricity Law has been modified by the 2014 Electricity Law. The Law covers the supply of electrical access for the nation's social and economic growth. Prices, licenses, fines, and the creation of an electrical regulating body, along with its responsibilities, are all covered. The Electric Power Generation Enterprise (EPGE), which manages and plans the Myanmar National Grid System, purchases electricity from both public and private producers and subsequently sells it to the Electric Supply Enterprise and Yangon City Electricity Supply Board. Myanmar's power sector is still governed by a state-owned buyer model. The EPGE receives assistance from the Energy Supply Board and various state and regional electricity supply boards for the procurement and distribution of electricity. Additionally, the Hydropower Generation Enterprise (HPGE), in collaboration with the Departments of Hydropower Planning and Implementation, is responsible for the operation and maintenance of large-scale hydroelectric facilities for public use.

The Myanmar government is receiving advice from several organizations as it updates its energy-related laws and regulations. Myanmar is confronted with several challenges in its efforts to formulate all-encompassing energy policies that would direct the sustainable utilization of natural resources and expedite infrastructure investment to guarantee a sufficient supply of energy to fulfill the swiftly increasing demand. In order to allow Myanmar to plan energy infrastructure investment, it is imperative that a strategy be developed for the usage of Myanmar's internal resources, which include natural gas, oil, coal, and renewables. Union government decision-making controls national electric power policy. These rules are now limiting the number of firms that may engage in Myanmar's energy market. The following power sector policies are currently implemented by the Ministry of Electric Power (MOEP);

- to use the energy resources available to generate power to ensure an adequate supply of electricity.
- to encourage the economical and efficient use of electricity to ensure our country's future energy reserves, sustainability, and self-sufficiency.
- To ensure the safe and reliable supply of power
- to improve the power distribution system that will be created using advanced technologies.
- to switch to environmentally sustainable methods for the production, distribution, and transmission of electricity.

- to reorganize the power industry to encourage more involvement from domestic and international investors and the creation of competitive power utilities, with the assistance of boards, private businesses, and regional organizations.
- to promote the nation's growth of electricity distribution and transmission, as well as public-private involvement in every industry.
- to establish the price for electricity by following worldwide and ASEAN energy pricing policies.
- to achieve the Millennium Development Goals, which include building new hydropower facilities and thermal power plants.

1948 observed the adoption of electricity laws, which were revised in 1967. The government established the laws governing electricity in Myanmar in 1984. These laws specify the qualifications needed to establish the electricity authority, the responsibilities and duties of electricity inspectors, the penalties and fines for different offenses, and the authority to grant permission for certain organizations, including foreign entities, to operate in the industry. Electricity regulations were introduced to the laws of 1984 in 1985. The government dissolved the 1984 law in 2014 and established the Electricity Regulatory Commission (ERC), providing it some regulatory authority. It also gives the Ministry of Electric Power (MOEP), state, regional, and local governments, as well as the top organizations of self-administrated zones and divisions, the authority to grant permits to organizations that will be involved in electricity-related projects like generation, transmission, and distribution, thus enticing both domestic and foreign investment in power projects (Morris LLP, et al., 2023).

3.5 Supply and Demand of Electricity in Myanmar

Myanmar is the biggest country in Southeast Asia, covering 676,577 square kilometers and having a population density of 92 people per square kilometer, making it the 40th largest country in the world. The Northern Hill Ranges, Western Yoma, Eastern Shan Highland, Central Plains, and Coastal Areas make up the geography and terrain. A nation's requirement for energy increases significantly when its business and social development sectors expand to a full extent. Energy is a necessary input, particularly for emerging nations seeking to expand their economies. Like Myanmar, where new investments are being made thanks to a process of economic policy transition, there is a sharp increase in the country's building and infrastructure development, which raises the country's energy consumption.

The main energy sources used in Myanmar include coal, hydropower, natural gas, crude oil, and wood/charcoal. The pattern of energy consumption is increasingly shifting from non-commercial energy sources like charcoal and firewood to commercial energy sources. During the 2011–2012 fiscal year, the amount of energy consumed from firewood and charcoal fell to 76.41% of total energy consumption, whilst the amount of energy consumed from natural gas and crude oil climbed to 15.03%.

An outstanding review on Myanmar's energy sector was recently produced by the Asian Development Bank (ADB). It contained projections of the Ministry of Electric Power's projected growth in electricity demand. Demand is shown to have doubled, from 12,459 million kWh in 2012–13 to 25,683 million kWh in 2018–19, representing a 13% annual compound growth rate.2. Moving to 2012–13 is unlikely to increase the total much over 10,500 million kWh, as the actual production in 2012 seems to have been only 10,000 million kWh. Approximately 1700 million kWh of the generated electricity will be exported. (In 2010 and 2011, exports of electricity were more than 1700 million kWh.) Thus, there will likely be 3659 kWh less power produced in 2012–13 than there is expected to be demand for it this year. For domestic consumption, production would need to increase by 42% to meet demand. Given that consumption increased by more than 1500 million kWh in 2013–14, there is a significant deficit. To make up for the current gap and the anticipated expansion, the supply net of exports would need to increase by around 5200 million kWh in 2013–14, or by over 60% over 2012–13.

Table (3.9) Estimated Annual Energy Demand and Maximum Energy Supply in Myanmar

Year	Demand (MW)	Supply (MW)	Actual Supply (MW)	Differences (MW)	Differences (%)
2012	1850	1850	1796	(54.00)	-3%
2013	2055	2055	1969	(86.00)	-4%
2014	2157	2248	2232	75.00	3%
2015	2376	2527	2497	121.00	5%
2016	2840	2840	2802	(38.00)	-1%
2017	2884	3192	3189	305.00	11%
2018	3178	3587	3586	408.00	13%
2019	3503	4032	3798	295.00	8%
2020	3862	4531	3891	29.00	1%
2021	4208	5092	3997	(211.00)	-5%
2022	4585	5723	3486	(1099.00)	-24%
2023	4996	6431	3169	(1827.00)	-37%

Source: Ministry of Electric Power, 2023

The demand and supply for electricity are increasing year after year, as Table (3.9) illustrates. Since 2012, supply has been negative; nevertheless, by 2023, it will have unexpectedly shifted negative again with 37% outage with electricity supply. According to the Myanmar National Electricity Master Plan, demand is expected to rise by 15% annually. However, as Table (3.9) shows, the country's demand for electricity would more than double by 2023.

CHAPTER IV
SURVEY ANALYSIS

4.1 Survey Profile

This study was a cross-sectional descriptive study conducted to role of electricity price and household consumption in Kalaw Township of Southern Shan Region. The area of Kalaw Township is 1507.7 km^2, density is 123.4/km^2, and the population is 186,083, there are 23 wards in town (UNFPA, 2015). Main resource of energy for cooking in Kalaw is electricity, LPG, Kerosene, Biogas, Firewood, Charcoal, Coal, others. And the main energy for lighting is Electricity, Kerosene, Candle, Battery, Generator (Private), Water mill (Private), Solar system/ Energy and others. For the time being in the electricity distribution system in Kalaw as 11kV, 3 feeders from the Kalaw Substation supply power to Kalaw Town through a 50 MVA distribution system (132/33/11). Six MW in total. In Southeast Asia, Myanmar has among of the lowest electricity prices. Since then, the government has increased tariffs many times; the most recent change went into effect on April 1, 2014. However, the government sets aside around Mk185 billion a year to cover the costs of distribution as well as generating. after an increase in pricing. Interestingly, the government lost Mk630 billion during the 2018–19 fiscal year. Because they set prices below the cost of production and that more people are utilizing power.

Following a year of substantial losses due to subsidies, the government announced a significant increase in power rates in June 2019, marking the first such announcement in five years. Then, the price for electricity has increased by double or nearly triple. Thus, this survey aims to investigate how Kalaw families' usage of energy is affected by price changes on the role of electricity price. The study is concentrated on the 120 respondents who reside in Kalaw Township. The Myanmar department of population estimates that there are 186,083 people living in the township, which is divided into 23 wards. Everyone residing in the township, whether in the countryside or the cities. This poll indicates that 90% of people in Kalaw Township live in their own home. This exceeds the Union average by a small amount.

4.2 Survey Design

This chapter is divided into three sections. The first section of survey attempts to investigate how household electricity use is impacted by electricity prices (Case Study in Kalaw). The descriptive method was applied for this study. The objective of a descriptive study is to paint a picture of sociodemographic, persons, or occupation, or to demonstrate how certain elements relate to one another and occur naturally. In Interviews conducted face-to-face are used to gather primary data. The data of ESE Kalaw Township area in Southern Shan is utilized for secondary data (conditions of residential electricity consumption before and after increasing their income in Kalaw township during 2021–2023) in second section. In the third section, choosing a sample and gathering data, 120 respondents from 23 wards participated in the survey. The study is conducted in 2024 during the months of March and April. Survey questionnaires are divided into six main sections: part A: Socio Demographic Characteristics of the Respondents (Households), Part B: The Current Status of Electricity Usage in Households, Part C: Households' level of satisfaction with electricity prices and availability, Part D: Effect of electricity price on household consumption Part E: Effect of Price Fluctuations and Part F: Potential for Change. A comprehensive questionnaire is included in the appendix.

4.3 Survey Results

There are five influencing factors on household's consumption behavior such as social factor, economic factor, personal factor, cultural factor and psychological factor. According to this study, a total of 120 households' electricity consumption is studied as follow role of electricity price significantly increased.

4.3.1 Socio Demographic Characteristics of the Respondents

Gaining more insight into the various elements influencing their attitudes, tastes, and actions was the aim of this section. This study shows a certain sociodemographic feature of the people who live in Kalaw Township and how their consumption of electrical power affects the price of electricity. Gender, age, education level, material status, occupation, type of housing, ownership or Percentage rent, number of working family members, gendered family sizes, and monthly family income were the eleven specific factors that were evaluated.

Table (4.1) Socio Demographic Characteristic of the Respondents

Age (Year)	**No. of Respondents**	**Frequency**
25 and less	30	25%
26 – 35	30	25%
36 – 45	30	25%
46 and above	30	25%
Gender	**No. of Respondents**	**Frequency**
Male	48	40%
Female	72	60%
Education Background	**No. of Respondents**	**Frequency**
Bachelor	66	55%
Master	0	0
Doctoral	0	0
Other (Diploma, Certificate, etc.)	54	45%
Marital Status	**No. of Respondents**	**Frequency**
Single	36	30%
Marriage	84	70%
Occupation	**No. of Respondents**	**Frequency**
Own Business	30	25%
Housewife	6	5%
Students	18	15%
Civil servant	6	5%
Company Staff	0	0
Unemployment	0	0
Retiree	0	0
Other	60	50%

Table (4.1) Socio Demographic Characteristic of the Respondents (Continued)

Dwelling Type	**No. of Respondents**	**Frequency**
Detached house	54	45%
Apartment	36	30%
Wooden house	12	10%
Other	18	15%
Rent or own house	**No. of Respondents**	**Frequency**
Rent	12	10%
Own	108	90%
Head of household's gender	**No. of Respondents**	**Frequency**
Male	114	95%
Female	6	5%
Number of family members	**No. of Respondents**	**Frequency**
Only one	0	0%
Two	36	30%
Three	18	15%
Four	48	40%
Five	6	5%
Six and above	12	10%
Employed family member	**No. of Respondents**	**Frequency**
Only One	0	0%
Two	36	30%
Three to four	54	45%
Above four	30	25%
Monthly Income	**No. of Respondents**	**Frequency**
Under Kyat 100,000	0	0%
Kyat 100,001 to 300,000	78	65%
Kyat 300,001 to 500,000	42	35%
Above Kyat 500,000	0	0%

Source: Survey Data, 2023

Out of the 120 respondents questioned, 48 were male and 72 were female shows in Table (4.1). There are four age groups. 25 and under, 26–35, 36–45, and 46 years and over are the age groups. Additionally, the survey deducted a quota of thirty respondents from each group. So, each age group has 25%. Many of the families with survey respondents are married. And most respondent's 66 percent have held a Bachelor, the rest 45 percent are others (Diploma, Certificate and etc) including undergraduate. There are no graduates with a master's degree. Of those who report their marital status 30 percent are single and the rest of them are married. When it comes to occupation, most respondents are others, while some work for companies, run their own businesses, are retirees, work for the government, and are unemployed.

Detached houses account for 45% of the respondents' home types, while the wood dwellings make up 10%, apartments account for 30%, and other types make up 15% of the analyses. A significantly 90% of participants presently possess their own homes, with a somewhat lesser percentage (10%) renting. Only 5 percent of households are headed by women, compared to 95% by men. The frequency of respondents having a working family member was as follows: none for those with only one, 30% for those with two working family members, 45% for those with three to four working family members, and 25% for those with more than four working family members.

Due to variations in expenditure and income, each household consumes electricity in a different amount overall. Electricity use is also significantly influenced by family income. Four categories have been identified based on the examination of monthly household income: MMK 100,000 and below, MMK 100,000 to 300,000, MMK 300,000 to 5,000,000, and MMK 500,000 and above. According to survey data shown in Table (4.1), of the 120 respondents, 65% earned between MMK 100,000 and 300,000, and 35% earned between MMK 300,000 and 500,000. No one earned more than MMK 500,000 or less than MMK 100,000.

4.3.2 Household Electricity Consumption in Current situation

The current situation of household electricity consumption for residential of Kalaw Township, Shan State, is the focus of this section. The annual increase in household usage preceded the increase in electricity prices. Investigating household consumption habits considering rising prices for electricity is therefore necessary. According to this analysis, 120 out of 158 households, or the majority, are aware that the government of Myanmar raised prices for electricity in July 2019. However, 108 out of 120 respondents are aware of the rationale behind the government's recent energy

price increases. Additionally, most respondents learn about the Ministry of Electricity's new electricity pricing from their neighbors and social media. The amount of electricity required for the residence to consume each month, the kinds of appliances they use, the average frequency of electrical failures, and the methods by which they pay for their electricity use all contribute to the status of household electricity usage. Every household acknowledges that their everyday activities depend on having electricity. The required household electricity consumptions are displayed in Table (4.2).

4.3.3 Status of Electricity Usage in Households

Table (4.2) Situation of Consumption during a Period of High Electricity Prices

Description	Frequency	
	Yes	No
Acknowledge government incensement of electricity price in July 2019	95%	5%
Acknowledge of the reason for government enact newly electricity charges	90%	10%
Essential of electricity for family	98%	2%
Total monthly unit of household consumption	100%	0%
Outage of electricity often in own area	100%	0%
Turning off the light while going out	100%	0%
Reducing electricity consumption if the price is increase	17%	80%

Source: Survey Data, 2023

According to the power outage analysis, most Kalaw Township residents indicate that their home experiences power outages frequently. It reveals that 25% of respondents, or 120 out of 120 said that power outages occur one to two times a day, while 20% said they occur three to four times a day. Nonetheless, 15% of those surveyed said that there had been a power outage in their neighborhood at some point. Every single person surveyed in Kalaw Township is experiencing a power outage.

Table (4.3) General Information with Consumption and Prices

Description	Frequency
Daily households require electricity for their home	
- A whole day (24 hours)	90%
- Half day	2.5%
- Only nighttime	3%
- Other	4.5%
Source of information the announcement of MOEP	
- Social media	40%
- TV	15%
- News	0%
- Neighbor	0%
- Family member	45%
- Others	0%
Available electricity application at home	
- TV	100%
- Light Bulb	75%
- Washing Machine	100%
- Rice Cooker	0 %
- Mobile Phone	65%
- Water pump	100%
- Air conditioner	100%
- Fan	40%
- Refrigerator	70%
- Electric Iron	100%

Table (4.3) General Information with Consumption and Prices (Continued)

Description	Frequency
The highest consume electricity appliances (Refer above question)	
- TV	0%
- Light Bulb	0%
- Washing Machine	0%
- Rice Cooker	0%
- Mobile Phone	0%
- Water pump	85%
- Air conditioner	15%
- Fan	0%
- Refrigerator	0%
- Electric Iron	0%
Requirement of household monthly electricity consumption	0%
- Less than 100 units	10%
- 101 to 300 units	90%
- 301 to 500 units	0%
- 501 to 1000 units	0%
- 1001 to 2500 units	0%
- Over 2500 Units	0%
Monthly outage of electric power at home	
- Once or Twice	25%
- Third or fourth	20%
- Sometimes	15%
- Often	35%
- Other	5%
Monthly electric bill payment	0%
- Under 10000	25%
- 10001-30000	
- 30001-50000	75%
- Above 50000	0%
Type of payment	
- Personal contact to the station	100%
- Mobile bill	0%
- Bill Connection Agent	0%
- Others	0%

Source: Survey Data, 2023

Household electrical expenditures have been categorized into four groups as the study has progressed: under MMK 10,000, MMK 10,001 to 30,000, MMK 30,001 to 50,000, and above MMK 50,000. Table (4.3) indicates that, prior to an increase in the price of electricity, 25% of household expenditures fell below MMK 10,000, 25% of respondents fell between MMK 10,001 and 30,000, 75% of respondents found between MMK 30,001 and 50,000, and no household spent more than MMK 50,000. Households paying more than $50,000 are also lowered under the new pricing structure, but the other three groups see increases. Only 16 percent of the payments are under MMK 10,000 after entitled new charges, 10 percent are between MMK 10,001 and 30,000, 72 percent are between MMK 30,001 and 50,000, and 2 percent are paid above MMK 50,000, according to Table (4.3). Only 16 percent of the payments are under MMK 10,000 after entitled new charges, 10 percent are between MMK 10,001 and 30,000, 72 percent are between MMK 30,001 and 50,000, and 2 percent are paid above MMK 50,000, according to Table (4.3).

Households typically receive invoices for electricity bills between the 11th and 15th of each month, and they have to pay them by the 19th or 23rd of the same month. ESE is able to suspend providing energy to the user if the payment is overdue. If the user fails to make the necessary payment after four months, ESE will physically remove the electricity meter from the user's residence. Electricity bills can be paid in a variety of methods, including in-person, via mobile device, through bill connection agents, and others. The analysis of how households pay their electricity bills (Table 4.3) indicates that the majority of households, or 100% of respondents, still pay their bills at the township office since there is not very development with other services like Yangon and Mandalay.

4.3.4 Result of Households' Level of Satisfaction with Electricity Prices and Availability

The primary cause of this section is that household satisfaction with electricity pricing and availability is a direct result of consumption behaviors. Modern life would be impossible without electricity, which is essential for everything from cooking and heating to lighting and communication. People's quality of life can be greatly impacted by unhappiness in several areas. The survey sample comprised the 120 Kalaw Township residents who answered the questionnaires; their replies are displayed as follows in Table (4.4). There are household satisfaction situations regarding the availability of

electricity, prices before and after increases in electricity charges, power outages following increases in electricity charges, and meter reading systems with options ranging from very dissatisfied to very satisfied.

Table (4.4) Households' Level of Satisfaction with Electricity Prices

Description	(1)	(2)	(3)	(4)	(5)	Mean Score
Being satisfied with electricity availability	5%	25%	65%	0%	5%	2.75
Being satisfied with prices before increase electricity charges	15%	0%	80%	0%	5%	2.80
Being satisfied with prices after the increase in electricity charges	0%	15%	65%	10%	10%	3.15
Being satisfied with the power outage after the increase in electricity prices	0%	65%	5%	10%	20%	2.85
Being satisfied with the electricity meter reading system	5%	40%	45%	0%	10%	2.70
Total						**3.00**

Source: Survey Data, 2023 (1. Very Satisfied, 2. Satisfied, 3. Neutral, 4. Unsatisfied, 5. Very Unsatisfied)

In this area, the household with the greatest proportion of 15% that expressed 80% "Neutral" was the most "very satisfied" with prices before a rise in power expenses. Among all the questions in this section, the respondent's most significant proportion (20%) expressed that they were "very unsatisfied" with power interruptions. Furthermore, most respondents, 80%, answered "Neutral." People's satisfaction with power outages following an increase in electricity prices is demonstrated by the table (4.4).

Based on the examination of households' satisfaction with electricity availability, as shown in Table (4.4), the majority of respondents, or 65%, expressed neutral about their availability of electricity. No respondent expressed unsatisfaction with the availability of electricity. Before the evaluation of the increase in prices for electricity, 80 percent of households reported being content, 5 percent were very unsatisfied, and 15 percent were very satisfied with the price before the increase. No

respondents reported being unsatisfied, and only 5 percent reported being extremely dissatisfied. After the increase in electricity prices, residents' satisfaction levels have dramatically changed. According to Table (4.4), 65% of households had a neutral opinion on the new electricity rates, 15% were satisfied, and no respondent indicated they were very satisfied. 10 percent of the residents, however, weren't satisfied with the new electricity price.

The outages are now significantly affecting family consumption as well. The purpose of this survey section was to find out how households felt about outages following the increase in electricity prices. According to Table (4.4), a large number of households (65 percent) expressed unsatisfaction and 20 percent were very unsatisfied with the power outage situation following an increase in electricity. Only 5 percent of households were neutral, 10 percent were satisfied, and 0 percent were very satisfied. The Ministry of Electric Power has been adopting the AMI system, which works together with meter equipment that can read the meter bill with the online system and information management systems, to quickly ascertain the power units consumed by energy consumers. 10 percent of the households included in the analysis expressed very unsatisfaction with the electrical meter reading system. Nonetheless, a sizable portion of households, 45% were neutral, 5% were very satisfied, and 40% were satisfied with the meter reading method.

4.3.5 Importance of Electricity Price on Household Consumption

Table (4.5) Importance of Electricity Price on Household Consumption

Description	Frequency	
	Yes	**No**
Using National Grip	100%	0%
Monitoring with electricity consumption	70%	30%
Equipment of monitoring electricity usage - Smart Meter - Bill - Manual Tracking - Other	 40% 42% 3% 15%	
A budget plan of monthly electricity usage	80%	20%

Source: Survey Data, 2023

Households typically receive invoices for electricity bills between the 11th and 15th of each month, and they have to pay them by the 19th or 23rd of the same month. ESE is able to suspend providing energy to the user if the payment is overdue. If the user fails to make the necessary payment after four months, ESE will physically remove the electricity meter from the user's residence. Electricity bills can be paid in a variety of methods, including in-person, via mobile device, through bill connection agents, and others. The analysis of how households pay their electricity bills (Table 4.5) indicates that all households of 100 % of respondents, still pay their bills at the township office since Kalaw is developing city and not very familiar other services.

4.3.6 Effect of Price Fluctuations on Household's Consumption

Table (4.6) The Effect of Price Fluctuations

Description	Frequency	
	Yes	No
Awareness of electricity price fluctuations	100%	0%
Awareness of the consumption changing on price fluctuations	68%	32%
Willing to change own consumption habits if the price increased significantly	85%	15%
Willing make changing of the ways of reducing appliance usage	75%	25%
The government intervention for electricity prices such as subsidies, energy efficiency programs, renewable energy investments	65%	35%

Source: Survey Data, 2023

Table (4.5) indicates that every respondent is aware of changes in the cost of electricity in Kalaw Township. The majority of respondents 68 percent replied "Yes" and 32 percent said "No" acknowledge that price variations have an effect on consumption. With 85% of respondents saying "Yes" and 15% saying "No," more than half of the respondents are willing to alter their personal consumption habits if prices rise dramatically. Most of the respondents are willing to make change with the way reducing appliance usage with 75% replied “Yes” that described more than half of the households respond “Yes”.

CHAPTER V
CONCLUSION

5.1 Finding

This study aims to ascertain the impact of electricity rates on household usage in Kalaw, Southern Shan state, as well as the obstacles faced and regulations to follow while distributing electricity under the MOEP for ESE. The primary objectives of this study are to determine efficient ways of using electricity every month to meet reasonable price ranges of residential consumers in Kalaw as well as the key factors influencing the amount of power utilized by residential users in Kalaw Township across all family income levels. When it came to residential energy consumption, the Kalaw household was primarily concerned with keeping updated on electricity prices, minimizing waste, monitoring their own bills and household appliances, and educating their neighbors about the highest and lowest electricity usage for their homes.

The sample for this study is mainly composed of 120 residents in Kalaw. In terms of gender, female respondents exceed male respondents, according to the survey findings. Most respondents are marriage when it comes to marital status. The quota of despondences is for all four ages group. Age this equal quantity is capable of survey since it is difference energetic, powerful, and mature with difference perspective. So, the difference ages of the household's knowledge with electricity prices whether young and old, because electricity is essential for any ages of respondence in their daily lives. The majority of responders graduated with bachelor holders.

According to the mean values analysis of the households, being satisfied with prices after the increase in electricity charges has the maximum mean value. It can be concluded that residential consumption is sufficiently changed after increasing electricity prices and it reaches a satisfactory level. The second maximum mean value comprises satisfaction with the power outage after the increase in electricity prices. The price of electricity effectively influences households' consumption. In addition, being satisfied with prices before increasing electricity charges and being satisfied with electricity availability at third and fourth and fifth position respectively. This result

shows that still needs to emphasis with households' satisfaction with increasing electric prices, satisfaction with electricity availability or new methods to promote the pricing and Tariff system. The ESE should consider and upgrade electricity outage for the improvement availability and sufficient for demand surplus. Satisfaction with the electricity meter reading system has minimum mean value, and it shows that the ESE needs to emphasis to be ensure with monthly meter reading for household.

Additionally, the all household utilizing national Grib and awareness of electricity price fluctuations on electricity usage. The findings indicate that they would be willing to change their own consumption habits if the price increased significantly. It has been determined that changing our own consumption habits if the price increased significantly. This indicates that such a household is willing to make changes to the ways of reducing appliance usage. The results of the survey indicate that the price of electricity is the most significant factor influencing the quantity of a household consumes; other factors that affect pricing include family size, age, gender, and income.

5.2 Suggestions

The purpose of this study to examine the role of electricity prices on households' electricity usage and discovered relationships between all aspects of consumption behavior. Raising prices is a positive move because it is a necessary short-term step toward putting the electricity industry on a financially sustainable path. The government will need to act in tandem with these reforms to save expenses and eliminate the numerous inefficiencies in the network that produces and distributes electricity. For example, it would be advantageous to have an effective, real-time data collection system to track the sector's operational and financial performance. Furthermore, it could be necessary to introduce a new tariff-setting approach to facilitate more frequent tariff revisions. Smart systems might enable homes and businesses to pump extra electricity into the grid in exchange for tariff offsets, allowing them to diversify their power sources and benefit on Myanmar's solar potential. Although the new tariff does not completely offset the expenditures of production and distribution, the government anticipates that it will slow the growth of the subsidy bill and free up money for capital investments in capacity expansion. As a result, unless the government encourages additional investment in gas-fired plants, hydropower stations, renewable energy, and distribution networks, there will still be power outages, which would eventually restrict economic growth.

The National Electrification Plan (NEP) of Myanmar emphasizes that the government's initiatives to improve the sector and boost generation capacity are based on the goal of achieving universal electrification by 2030. The World Bank is behind the idea, offering the government a $400 million credit line to assist it reach its goals. To achieve 100% electrification by 2030, the NEP has set out particular benchmarks, with the goal of reaching 50% electrification by 2020 and 75% by 2025. Long-term electrical supply will come from the main grid, while off-grid alternatives will be needed to meet short- and medium-term demand. In the next years, home solar photovoltaic systems which are already growing in popularity in Myanmar are probably going to become even more widespread.

In conclusion, modifying energy rates is but one element of an overall strategy, even if it is a crucial step in resolving power outages and increasing electricity availability. In Myanmar, achieving a steady and dependable power supply for homes and businesses necessitates a comprehensive approach that includes investments in infrastructure, regulatory changes, demand management, and initiatives to lower energy theft and losses. In addition, creating a culture of energy conservation and ethical energy use requires public awareness and engagement. Therefore, raising the price of electricity could lessen the amount that the government is responsible for covering those who lose their power. To increase public support, satisfaction, and consumption, the government could also organize public awareness campaigns and improve household access to electricity.

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QUESTIONNAIRE

Questionnaire survey for "THE EFFECT OF ELECTRICITY PRICE ON HOUSEHOLD ELECTRICITY CONSUMPTION (CASE STUDY IN KALAW)"

I am Mg Nyein Chan, an MPA (online) student from Yangon University of Economics. My thesis is about **A STUDY ON THE EFFECT OF ELECTRICITY PRICE ON HOUSEHOLD ELECTRICITY CONSUMPTION (CASE STUDY IN KALAW).** This survey questionnaire is only to complete my thesis. It will take about 20 minutes to complete. All responses will be kept confidential. Your kind cooperation in providing this information would be much appreciated.

Section A: Socio Demographic Characteristics of the Respondents (Households)

Please put a tick (√) in the box indicating that your personal data is relevant.

Demographic Characteristics

1. Your age (Years)
   - ☐ 25 and Less
   - ☐ 26 - 35
   - ☐ 36 - 45 years
   - ☐ 46 and above

2. Gender:
   - ☐ Male
   - ☐ Female

3. Educational Background:
   - ☐ Bachelor
   - ☐ Master
   - ☐ Doctoral
   - ☐ Others (Diploma, Certificate, etc.)

4. Marital Status
   - ☐ Single
   - ☐ Marriage

5. Occupation
   - ☐ Own business
   - ☐ Housewife
   - ☐ Students
   - ☐ Civil servant
   - ☐ Company Staff
   - ☐ Unemployment
   - ☐ Retiree
   - ☐ Other

6. What is your dwelling type?
   - ☐ Detached house
   - ☐ Apartment
   - ☐ Wooden house
   - ☐ Other

7. Do you rent or own the place where you live?
   - ☐ Rent
   - ☐ Own

8. Who is the head of your household?
   - ☐ Male
   - ☐ Female

9. How many numbers are there in your family?
   - ☐ Only one
   - ☐ Two
   - ☐ Three
   - ☐ Four
   - ☐ Five
   - ☐ Six

10. How many of them are currently working?
    - ☐ Only one
    - ☐ Two
    - ☐ Three to Four
    - ☐ Above four

11. What is your approximate total households' monthly income?

☐ Under kyat 100,000 kyat

☐ 100,001 to 300,000

☐ Kyat 300,001 to 500,000

☐ Above 500,000

Section B: The Current Status of Electricity Usage in Households

12. Do you know, Myanmar government increased electricity prices from July 2019?

☐ Yes ☐ No

13. Do you know why the government enact newly electricity charges?

☐ Yes ☐ No

14. Where do you get the information about electricity announced by the Ministry of Electricity?

☐ Social media ☐ TV

☐ News ☐ Neighbor

☐ Family members ☐ Others

15. Do you accept electricity is necessary for your family?

☐ Yes ☐ No

16. How much electricity requirement in your households a day?

☐ 24 hours ☐ Half day ☐ only nighttime ☐ other

17. What are the application of electricity in your households?

☐ TV ☐ Light Bulb

☐ Washing Machine ☐ Rice Cooker

☐ Mobile Phone ☐ Water pump

☐ Air conditioner ☐ Fan

☐ Refrigerator ☐ Electric Iron

18. Which appliances do you think consume the most electricity?

(according to No.14) _____.

19. Do you know how many of your households use electricity units per month?

☐ Yes ☐ No

20. If yes, how many average electricity units are required in your households in a month?

☐ less than 100 units ☐ 101 to 300

☐ 301 to 500 ☐ 501 to 1000

☐ 1001 to 2500 ☐ over 2500

21. Is there often electricity going out in your area?

Yes No

22. If yes, how many times per month?

☐ once or twice ☐ third or fourth

☐ sometimes ☐ often

☐ other

23. If yes, how many average electricity units are required in your households in a month?

☐ less than 100 units ☐ 101 to 300

☐ 301 to 500 ☐ 501 to 1000

☐ 1001 to 2500 ☐ over 2500

24. How much are your monthly electricity expenses before increase electricity prices?

☐ Under 10000 ☐ 10001- 30000

☐ 30001 – 50000 ☐ Above 50000

25. How much are your monthly electricity expenses after increase electricity prices?

☐ Under 10000 ☐ 10001- 30000

☐ 30001 – 50000 ☐ Above 50000

26. Do you turn off the lights when you do not use them?

☐ Yes ☐ No

27. Do you try to reduce your electricity consumption when electricity prices are high?

☐ Yes ☐ No

28. How do you pay for electricity charges?

☐ Personal contact to the station ☐ Mobile bill

☐ Bill connection agent ☐ Others.

Part C. Households' level of satisfaction with electricity prices and availability

29. Do you feel satisfied with electricity availability from electric power plants?

☐ Very satisfied ☐ Satisfied ☐ Neutral

☐ Unsatisfied ☐ Very Unsatisfied

30. Do you feel satisfied with prices before increase electricity charges?

☐ Very satisfied ☐ Satisfied ☐ Neutral

☐ Unsatisfied ☐ Very Unsatisfied

31. Do you feel satisfied with prices after the increase in electricity charges?

☐ Very satisfied ☐ Satisfied ☐ Neutral

☐ Unsatisfied ☐ Very Unsatisfied

32. Do you feel satisfied with the power outage after the increase in electricity prices?

☐ Very satisfied ☐ Satisfied ☐ Neutral

☐ Unsatisfied ☐ Very Unsatisfied

33. Do you feel satisfied with the electricity meter reading system?

☐ Very satisfied ☐ Satisfied ☐ Neutral

☐ Unsatisfied ☐ Very Unsatisfied

Part D: Effect of electricity price on household consumption

34. Do you make use of the national grid?

☐ Yes ☐ No

35. Do you monitor your electricity usage?

☐ Yes ☐ No

36. If yes, how do you monitor your usage?

☐ Smart meter ☐ Bill ☐ Manual Tracking ☐ Other

37. Regarding your monthly electricity usage, do you have a plan budget?

☐ Yes ☐ No

Part E: Effect of Price Fluctuations

38. Are you aware of fluctuations in electricity prices?

☐ Yes ☐ No

39. Do you think the price of electricity is too expensive now?

☐ Yes ☐ No

40. Have you noticed any changes in your electricity consumption due to price fluctuations?

☐ Yes ☐ No

41. If yes, do you change it in any way?

☐ Yes ☐ No

Part F: Potential for Change

42. Would you be willing to change your electricity consumption habits if the price increased significantly?

☐ Yes ☐ No

43. If yes, what changes would you be willing to make? (e.g., reduce appliance usage, switch to more energy-efficient appliances, install solar panels)

☐ Yes ☐ No

44. What measures do you think the government should take to address rising electricity prices? (e.g., subsidies, energy efficiency programs, renewable energy investments)

☐ Yes ☐ No