MICHAEL JOSEPH LAMIN

ENERGY JUSTICE: THE UNFAIR ELECTRICITY DISTRIBUTION IN SIERRA LEONE

MASTER

2023

NEAR EAST UNIVERSITY

INSTITUTE OF GRADUATE STUDIES

DEPARTMENT OF INTERNATIONAL RELATIONS

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M.A. THESIS

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Approval

We certify that we have read the thesis submitted by Michael Joseph Lamin titled **"Energy Justice: The Unfair Electricity Distribution in Sierra Leone"** and that in our combined opinion it is fully adequate, in scope and quality, as a thesis for the degree of Master of International Relations.

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Declaration

I hereby declare that all information, documents, analysis and results in this thesis have been collected and presented according to the academic rules and ethical guidelines of the Institute of Graduate Studies, Near East University. I also declare that as required by these rules and conduct, I have fully cited and referenced information and data that are not original to these studies.

Michael Joseph Lamin
29/06/2023

Acknowledgments

All praises and thanks to Almighty Allah for everything. My parents Mr & Mrs. Sheriff who have shown me unconditional love and support throughout my academic journey. Your faith in my ability is my greatest motivation and I am forever indebted to you. My siblings Zainab and Mohamed I love you guys endlessly. Special regards to Assoc. Prof. Dr. Sait Aksit. I am privileged to have you as my supervisor and course advisor respectively. It is an honor to be your mentee. My sincere appreciation to all tutors of the International Relations department at Near East University. I learned a lot from each of you. I wish you all the best in your respective endeavors.

I am forever grateful to the people listed above.

Michael Joseph Lamin

Abstract

Energy Justice: The Unfair Electricity Distribution in Sierra Leone

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June 2023, 113 Pages

Energy justice is described as the goal of achieving equality in energy access. Despite all forms of scarcity, electricity scarcity has been regarded as a form of energy injustice. This is because the goal of energy justice is to ensure fair access to safe and reasonable energy. The injustice is magnified when marginalised localities are ignored in electricity distribution. This study aims to understand the reasons for the unfair distribution of electricity and the impact of power shortage on sustainable development in Sierra Leone. The study employs a qualitative methodology collecting data through official documents, journal publication, articles, news reports, website materials and expert opinions. Analysis was done on the energy situation, energy sector, energy efficiency, demand and supply, renewable energy, energy policy and electricity and sustainable development. The findings of the study indicate that ineffective energy policy implementation, mismanagement of the energy sector and a low installed power capacity are the causes of electricity shortages in Sierra Leone. Further findings indicate that insufficient funding for the electricity supply system, limited modern technology for electricity supply and insufficient energy infrastructures are the factors affecting the power supply in Sierra Leone. As a result of this, the objectives of sustainable development which include eradicating poverty, and improving the education and healthcare system depend on efficient power supply. Therefore, electricity outages have an adverse impact on the objectives of sustainable development, and this is preventing Sierra Leone to achieve sustainable development. This study recommends an effective energy implementation, increased energy infrastructures and sufficient funding for the electricity supply system will help increase the electricity supply in Sierra Leone.

Keywords: Energy injustice, Sierra Leone, electricity distribution, sustainable development.

Özet

Enerji Adaleti: Sierra Leone'de Adaletsiz Elektrik Dağıtımı

Lamin, Michael Joseph
Yüksek Lisans, Uluslararası İlişkiler Bölümü
Danışmanı: Doç. Dr. Sait Aksit
Haziran, 2023, 113 sayfa

Enerji adaleti, enerjiye erişimde eşitliği sağlama hedefi olarak tanımlanmaktadır. Her türlü kıtlığa rağmen, elektrik kıtlığı bir tür enerji adaletsizliği olarak görülüyor. Bunun nedeni, enerji adaletinin amacının güvenli ve makul enerjiye adil erişimi sağlamak olmasıdır. Elektrik dağıtımında ötekileştirilen mahalleler göz ardı edildiğinde adaletsizlik daha da büyüyor. Bu çalışma, Sierra Leone'de adaletsiz elektrik dağıtımının nedenlerini ve elektrik kesintisinin sürdürülebilir kalkınma üzerindeki etkisini anlamayı amaçlamaktadır. Bu çalışma niteliksel bir yöntemle resmî belgeler, dergi yayınları, makaleler, haberler, web sitesi materyalleri ve uzman görüşleri gibi kaynaklar kullanılarak hazırlanmıştır. Çalışmada, enerji durumu, enerji sektörü, enerji verimliliği, talep ve arz, yenilenebilir enerji, enerji politikası ve elektrik ve sürdürülebilir kalkınma konularında analizler yapılmıştır. Bu çalışma, etkisiz enerji politikası uygulamasının, enerji sektörünün yanlış yönetilmesinin ve düşük kurulu güç kapasitesinin Sierra Leone'deki elektrik kesintilerinin nedenleri olduğunu ortaya koymaktadır. Diğer bulgular, elektrik tedarik sistemi için yetersiz finansman, elektrik tedariki için sınırlı modern teknoloji ve yetersiz enerji altyapısının, Sierra Leone'deki güç arzını etkileyen faktörler olduğunu göstermektedir. Bunun bir sonucu olarak, yoksulluğun ortadan kaldırılması, eğitim ve sağlık sisteminin iyileştirilmesi gibi sürdürülebilir kalkınma hedefleri verimli güç kaynağına bağlıdır. Bu nedenle elektrik kesintileri sürdürülebilir kalkınma hedeflerini olumsuz etkilemekte ve bu durum Sierra Leone'nin sürdürülebilir kalkınmaya ulaşmasını engellemektedir. Bu çalışma, etkili bir enerji uygulaması, enerji altyapılarının artırılması ve elektrik tedarik sistemi için yeterli finansmanın Sierra Leone'deki elektrik arzının artmasına yardımcı olacağını önermektedir.

Anahtar Kelimeler: Enerji Adaletsizliği, Sierra Leone, Elektrik Dağıtımı, Sürdürülebilir Kalkınma.

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List of Abbreviation

BKPS: Bo-Kenema Power Service

BHEP: Bumbuna Hydroelectric Project

EDSA: Electricity Distribution and Supply Authority

EGTC: Electricity Generation and Transmission Company

EU: European Union

EWRC: Electricity and Water Regulatory Commission

GoSL: Government of Sierra Leone

LPG: Lamp fuel and melted petrol gas

MAFFS: Ministry of Agriculture, Forestry and Food Security

MCC: Millennium Challenge Corporation

MEWR: Ministry of Energy and Water Resources

MMR: Ministry of Mining Resources

MTI: Ministry of Trade and Industry

NPA: National Power Authority

NEPAD: New Partnership for Africa Development

RETS: Renewable Energy Technologies

SEFA: Sustainable Energy for All

WAPP: West Africa Power Pool

PPP: Public and Private Sector Partnership

CHAPTER I

Introduction

Energy justice is a topic that has attracted massive attention in the social science research area dealing with energy access. Energy justice examines who has access to resources, how power is allocated, and the function of the government in guaranteeing fair access. To determine whether some groups, such as low-income families or those residing in distant places, are deprived of energy access, researchers have tried to understand how access to energy is distributed (Kirsten et al., 2015). Energy justice also addresses the costs associated with energy services, the application of modern technologies to address the demands of people who are denied access to energy services, and the effects of power outages on vulnerable groups. The environment, people's health, and living standards are all significantly impacted by energy justice challenges. Inequalities in the advantages and costs of energy production and consumption, which disproportionately affect vulnerable people, are referred to as energy justice challenges. Moving towards renewable energy sources and ensuring equal access to energy services are necessary to address these issues. Energy justice issues are complicated and need a multidisciplinary approach to be effectively resolved. To protect disadvantaged communities from the detrimental effects of energy production, it is imperative to guarantee equal access to clean energy sources. In low-income and marginalised regions, where access to clean and inexpensive energy is frequently restricted, energy justice concerns are particularly widespread (OECD & World Health Organization, 2018).

Researchers can better comprehend the intricate connections between energy availability, governmental policy, economic injustice, and marginalisation by analysing the concerns of energy justice (Apple, 2011). Unfortunately, because of the field's enormous scope and strong interactions with other fields, comprehending energy justice can be a challenging endeavour. To find the most efficient and just solutions to the energy problems that still affect vulnerable groups all over the world, it is crucial for academics and professionals to create an understanding of energy justice. To achieve this comprehensive understanding of energy justice, the perspectives of those most

directly impacted by unequal access to electricity supply, as well as those involved in energy justice projects, must be considered. As a result, there are conflicting views and a limited number of research regarding the reasons for the unfair distribution of electricity in Africa—for example, the challenges of energy supply for Sierra Leone's economic development (Koroma & Rongcheng, 2009). There is a huge difference between urban and rural areas in terms of access to electricity, with a far smaller proportion of rural homes having access to electricity than urban residents. To close this gap and offer electricity to all citizens, the government of Sierra Leone (GoSL) and international organizations are actively working (Koroma & Rongcheng, 2009).

This study aims to understand and analyse the reasons and different contributing factors for the unequal and unfair distribution of electricity in Sierra Leone. As such, the study intends to comprehend why certain places in Sierra Leone have access to dependable and reasonably priced electricity while others have no access at all. It does this by investigating how energy is distributed in Sierra Leone and the underlying causes behind this distribution. This study will offer a thorough review of the current electricity system and the underlying causes of the country's unequal distribution of power. This chapter introduces the analysis by first discussing the background, statement of the problem, the purpose of the study, research questions, and significance of the study, followed by the methodology, limitations, thesis structure, and finally, the definition of terms.

Background of the study

The study of energy justice has recently emerged as a significant topic of social science research aiming to address the core principles of energy justice (McCauley et al., 2013). The research includes the production of energy and systems (Hefferon & McCauley, 2014), energy consumption (Jenkins et al., 2014), and energy policy and security (Sovacool et al., 2014). Energy is a resource used for various social amenities. People need energy in their daily lives. Energy dependence is enormous in the modern world because everything we use requires energy. For example, communities, public institutions, and other facilities need energy because appliances, machines and machinery need the energy to be operational. Energy is used for heating, cooling,

lighting, and cooking. Energy is needed for the functioning of the world's infrastructures. It produces clean water from wastewater and pumps fuel to vehicles and supplies electricity to the home.

Justice, on the other hand, consists of three tenets: Equitable resource allocation is the first tenet that is referred to as distributive justice. This idea is frequently brought up in discussions about social and economic inequality, as well as in arguments over governmental actions and taxation. It is a fundamental idea in many theories of justice and has significant ramifications for how one approaches the challenges of inequality and poverty. Secondly, procedural justice: The term procedural justice refers to the fairness and transparency of decision-making processes rather than the outcomes themselves. This principle is often used in legal and political contexts to ensure that all individuals are treated fairly and equally under the law. Lastly, recognition of various sectors of society: This includes marginalised and underrepresented groups, as well as those without a voice or a platform to share their stories. By acknowledging and valuing the contributions and perspectives of all sectors, the government can work towards creating a more inclusive and equitable society (Scholosberg, 2013).

Energy justice is described as the goal of achieving equity in access to energy. For justice researchers, energy has become their new focal point (Coy et al., 2021). There is plenty of evidence of the energy challenge. Globally, it is known as resource shortages and rising populations occurring in a society with growing social and environmental unpredictability. Many conceptual frameworks have evolved to investigate and comprehend such events. Each paradigm draws a distinct focus on the subject and goal of energy research, which is widely debated. To identify the unjust transmission and distribution practices and lessen the impact of lack of energy access, communities' energy vulnerabilities are examined by energy justice (Middlemiss & Gillard, 2015). Energy justice presents a chance to create new, interdisciplinary social scientific objectives for investigating where injustices occur, new methods for prevention and redress, and identifying new societal subgroups. As a result, it is a topic that motivates both normative approaches and evaluative perspectives. Second, energy justice offers a fresh paradigm for connecting past and present studies on energy utilisation. The entire focus has been on energy justice, which analyses where injustices

occur, which impacted communities in society are marginalised and what mechanisms are available to address them. This evaluation helps to expose and lessen such injustices. There has been a need to shift toward human-centred social science investigations of energy trends in the survey of recent energy scholarship in the social sciences. Sovacool (2014) highlighted several areas of study and the importance of human-centred study designs, ideology, and ethics of energy studies. In addition, he indicates that energy justice recognizes that energy needs to be incorporated into the list of things that are prized; how one distributes the rewards and responsibilities of energy systems is primarily a priority for every community that wants to be fair.

According to Boardman (2013), researchers are prompted to investigate the origins of energy inequalities by distributional justice. Developing countries have expressed worries about justice due to the placement of production facilities such as petrol energy plants. The distributional impact of growing energy prices has also been questioned by studies on energy poverty. Researchers are compelled by recognition-based justice to evaluate which societal groups are marginalised or misrepresented. Several energy justice studies have aimed to highlight the inequitable placement of power plants close to ethnic minorities or indigenous peoples, who are excluded from decision-making (Jr, Manuel et al. 2001). Energy studies have also revealed the difficulties faced by the elderly or people with disabilities (Boardman 2013, Liddell & Morris, 2010). The study of decision-makers attempts to engage with communities is stimulated by procedural justice. According to Warren and McFadyen (2010), encouraging a sense of community ownership can, for instance, lead to the development of new acceptance processes. Therefore, unlike what is typically done, identifying procedural inequities, or exposing exclusionary mechanisms (Gibson-Wood & Wakefield, 2013). Energy justice focuses primarily on marginalised communities that have been ignored in the distribution of energy as it endeavours to make energy accessible, affordable, and equitably distributed (McCauley & Heffron, 2018). Its principles focus on where injustices in energy distribution lie (McCauley et al., 2015). Components of energy justice recognize the need for energy to be produced, prized, and distributed equally across the world (Sovacool, 2014). Energy justice also provides a

valuable opportunity to investigate the injustice distribution of energy (Heffron & McCauley, 2014).

Electricity has been traditionally distributed partially in Sierra Leone. In several parts of the country, populace dwellers struggle to access affordable, accessible, and efficient electricity (Versloot et al., 2022). The productive use of electricity in public institutions is affected by less access to energy. Public institutions in Sierra Leone, especially educational institutions, and health facilities do not have access to reliable electricity. Educationally, in the event of a pandemic outbreak such as the recent COVID-19 pandemic, it has been difficult for educational institutions to set up distance learning. This has led to disruptions in academic schedules and affected the learning outcomes of students. This is due to issues such as a lack of infrastructure, limited access to technology, and a lack of electricity. In addition, the importance of reliable and uninterrupted power supply in health facilities is undeniable. Inadequate power supply poses a threat to people's lives. For instance, an emergency requiring surgery would not be performed, without electricity. Medicines and other medical equipment need to be stored in electrical equipment such as freezers or refrigerators. Therefore, unreliable electricity is an obstacle to the necessary operation of public facilities. A quarter of education and health facilities access substandard electricity, and the other half to unreliable electricity in Sierra Leone (WHO & World Bank, 2014). As a result, public institutions' lack of access to reliable electricity, standard education, and better health care remains a challenge. Low-income earners can hardly afford electricity because of the cost of electricity. And these vulnerable people struggle to afford uninterrupted electricity given the high-cost electricity. Some people are already grappling with the challenge of paying for their own basic needs like food and shelter, so adding extra charges in the form of higher electricity bills only adds to the burden and makes things even more difficult for an already vulnerable population. This is why it is so important for the community to come together and take steps to prevent power cuts and help people who are struggling to pay their bills or afford the costs associated with having their power cut in the first place.

According to Foster & Witte (2020), “the high cost of electricity rate remains a barrier to efficient electricity distribution in access-deficient countries”. Energy-

supplying appliances would make energy access affordable, yet the excessive cost associated with these appliances creates availability issues-particularly people in rural communities (Waldron & Hacker, 2020). The issue of energy poverty for those living in rural regions is made worse by this price, poor earnings, and a lack of access to financing for these types of equipment. Rural areas experience energy poverty due to a lack of access to energy-supplying equipment, making it difficult for them to benefit from any economic opportunities that more reliable access to electricity could present. As a result, the energy access gap between rural and urban people widens and becomes increasingly challenging to close. Policymakers should think about giving residents who reside in remote regions financial support like subsidies, grants, and tax breaks to lower the price of these products and make them affordable. Also, authorities must consider strategies to lower energy poverty by developing strategically rural infrastructure. This might lower the cost of energy-producing appliances and give people in remote areas access to a steady supply of electricity. Policymakers could do this by bridging the energy divide between rural and urban communities, resulting in economic growth for people living in rural areas. Governments should also think about giving grants and subsidies to companies that produce these energy-supplying products in rural areas. Because of the positive feedback loop that would result from the increasing demand for energy-efficient products brought about by increased economic growth, this might have a positive knock-on effect. In the end, giving rural areas better access to energy-efficient technology could be quite beneficial. Also, government incentives for energy efficiency may help rural areas. These incentives could take the form of subsidies to help rural towns become more energy-efficient, as well as tax credits for residents and businesses that install energy-efficient items.

Women and children also face additional inequalities and challenges as they become exposed to hazardous health issues and children die a premature death due to the problems of using biomass energy for cooking, heating, and cooling. Recent studies reveal that women's participation in the energy sector needs improvement (PowerforAll, 2019). The decisions made are impacted by unequal representation in various organisations, including business, municipal, national, and international governmental agencies, as well as non-state players (Secretariat, PBF, 2023). Inequalities between

men and women and members of ethnic minorities are widespread in government. Women are "significantly under-represented in all sorts of leadership positions," according to 2023 research conducted by Secretariat, PBF, across the political, commercial, non-profit, and media sectors. The results of a different study conducted in 2013 about minority representation arrived at a similar conclusion (Secretariat, PBF, 2023). This condition, in which “hegemonic institutions, practices, and ideologies replicate men's privileged status,” is referred to as "injustice" (Pulido, 2000). Energy justice researchers need to understand the broader “social processes underlying the social production of inequality.” The role of institutional misrepresentation as a driver of unfair energy decisions must also be examined and challenged in an energy justice study (Pellow & Brulle, 2005). Instead of waiting for the affected communities, groups, women, and children to react to injustice, improving representation in these institutions offers a more proactive way to obtain justice in the various institutions in society by encouraging the participation of all groups (Buckingham & Kulcur, 2009).

Biomass energy is the most common energy used in Sierra Leone for cooking. Sierra Leone is among the regions that have the least clean cooking solution (Patel, 2017). Despite some improvements made in the energy framework, many access-deficit countries are struggling to enact an advanced energy access framework for electricity and clean cooking (ESMAP, 2020). Also, deforestation creates both climate and environmental problems because it exposes communities to hazardous natural disasters that will affect communities. For instance- one of the reasons for the 2017 landslide in Sierra Leone which led to the loss of many lives and properties as well as leaving many people homeless was because of mass deforestation.

Again, the world’s energy system is rapidly changing due to technological development, policy imperatives and changes in the economy and politics (Tomala et al., 2021). In international relations’ ambitious effort to address the world economic situation, sustainable energy revolution narratives have emerged in research on energy policy (Winskel & Kattirtzi, 2020). The transition towards a sustainable energy future requires substantial changes in policy and innovation across all levels of societal landscapes. Paramount among them is a change in the implementation of energy policy to move regions closer to their energy sustainability target (Caragliu & Graziano, 2021).

Energy sector policymakers should organise an effective socio-economic and political disruption by using insights from multidisciplinary experts through a wider range of methods for energy production, distribution, consumption and conservation of energy sources (Hanna & Gross, 2021). Energy policies and programs should be designed to improve technology and behaviours as well as choices of energy efficiency (Zhu et al., 2021). Legislative and non-legislative bodies play important roles in the energy sector because they are intertwined with energy-related policy. Legislative bodies are responsible for creating laws and regulations that govern the energy sector, while non-legislative bodies provide recommendations and guidance to policymakers. Both types of bodies are essential to shaping the future of the energy industry (Matschoss et al., 2021). However, poor implementation of energy policy has negative implications for the environment, climate conditions, the economy as well as international relations, which, despite its adverse consequences, share common negative impacts. The implementation of the energy policy provided by the government (or energy sector policymakers) will make electricity distributed equitably across society. Failure to implement the energy policy will create a challenge for distribution.

Modern energy services are significant for electricity distribution solutions. The provision of modern energy services to marginalised communities will not only solve lighting and cooking solutions but also creates multidimensional benefits. They include economic opportunities, gender equality, healthcare facilities advancement and an advanced schooling system. Modern energy is a significant element of remote communities' electrification programs in Sierra Leone. The use of modern energy would reduce the dependency on sophisticated electricity supply. Its availability will reduce the lack of electricity, particularly in rural communities. Notwithstanding, there is an obstacle to its affordability for vulnerable people who cannot afford it. Its usage will help solve the poor power supply to rural communities. For example, modern energy can be used for lighting, cooling, heating and cooking. Electricity supply is pivotal to sufficient food, housing, water, health and education which are significant perspectives for tending to sustainable development (Koroma & Rongcheng, 2009). Effective energy creation cycles can upgrade provincial and metropolitan and have a huge unlimited scope of events, henceforth a more reasonable method for the creation of labour and

product (Pearce & Webb, 1987). A reliable power supply is related to the scope of financial issues, including poverty reduction, populace development, urbanisation and opportunity for achieving sustainable development. With respect to the government of Sierra Leone's endeavour to achieve sustainable development, the efficient supply of electricity is closely related to achieving this goal wherein, the consistent operation of public institutions, industries, as well as non-state actors, requires an uninterrupted power supply. As a result of the inefficient power supply, the goal of achieving sustainable development would remain a far vision to achieve if the supply of electricity remains unstable.

The rate of people who have access to electricity in Sierra Leone is sad, wherein, twelve per cent of the rural population and two per cent of the urban dwellers have electricity (OECD & World Health Organization, 2018). Half the population struggles to get electricity and the other unreliable electricity. The current state of Sierra Leone's electricity condition is in acute need of improvement. Sierra Leone has one of the lowest electricity supply rates (Rural Renewable Energy Project, 2022). This is mainly because Sierra Leone has one of the lowest GDP per capita in Africa. As a result, the country's population relies on fossil fuels such as diesel and firewood to provide for their energy needs. The lack of a reliable energy infrastructure coupled with an inefficient power grid means that many households do not have access to electricity. The main source of electricity is the Bumbuna hydropower scheme, which operates more effectively in the rainy season than it does during the dry season (Hirmer et. al., 2021).

Access to energy has turned into a fundamental issue with its fast-growing dense population and the need for an upgrade in the distribution and access to electricity is urgent. The nation of Sierra Leone must find a way to meet the energy needs of its growing population while yet upholding its regulatory targets. To achieve this, Sierra Leone should implement an Integrated Energy Planning Framework to guarantee that the country's energy demand can be met while simultaneously safeguarding its environment and natural resources. The development and expansion of the national power network, improving the effectiveness of electricity production, encouraging renewable energy sources, and diversifying the supply mix to include hydrocarbons and other sources should be the main objectives of this framework. Implementing this

framework would allow Sierra Leone to fulfil the requirements of its expanding population and create a thorough energy infrastructure that fosters economic development while safeguarding the country's environment. In addition to policies to lessen energy poverty and enhance energy security, the Integrated Energy Planning Framework should also include actions to promote energy access for low-income communities. With this method of energy planning, Sierra Leone will be able to profit from economic expansion while reducing its negative environmental effects and building a more egalitarian, secure, and resilient energy system.

Despite infrastructure upgrades and wider distribution, there are still large gaps in access to power between urban and rural communities. The existing electricity structure and its regulations, as well as any potential future effects they might have on the accessibility of electricity, will be examined in the study. To explore the causes of this imbalance, the research will also consider several political, economic, and social aspects, including access to contemporary technology, gender imbalance, poverty, and policy infrastructures. The study's conclusions will be used to determine potential solutions for improving the electricity supply in Sierra Leone because there have been improvements in other African states in the electricity supply area while not much improvement has been made to increase electricity access in the regions of Sierra Leone. The study looks into Sierra Leone's electricity system from the post-conflict reconstruction in 2000 to the present. This is because the government's post-war, Ebola, and COVID-19 development plans prioritised energy sector reconstruction.

Statement of the problem

Electricity is significant for environmental development, educational institutions, and health facilities. Numerous studies have investigated the need provided by electricity. For instance, effective energy creation cycles can upgrade provincial and metropolitan areas and have a huge unlimited scope of events, henceforth a more reasonable method for the creation of labour and product (Pearce & Webb, 1987). Also, an electricity supply is pivotal to sufficient food, housing, water, health, and education which are significant perspectives for tending to sustainable development (Koroma & Rongcheng, 2009). Likewise, electricity is important for space and water warming,

cooling, and lighting (Hunt & Ryan, 2015). However, these studies have traditionally focused on electricity's transmission, distribution, and economic aspects. This body of research presents the problem of the unfair distribution of electricity in Sierra Leone. As a result, the existing research is limited to Sierra Leone's electricity problem. This study assumes ineffective energy policy implementation, a lack of modern energy technologies, insufficient tariff management, and insufficient use of renewable energy, followed by the negative impact of an electricity shortage on sustainable development in Sierra Leone relating to energy injustice and electricity distribution.

Purpose of the Study

There has been a strong connection between poor regulation of the electricity sector and irregular electricity supplies in Sierra Leone. This is due to the lack of enforcement of laws and the lack of transparency in the electricity transmission and distribution process, which are the primary causes of the irregular supply of electricity. The inability of the country's energy sector to efficiently distribute energy to the populace has been hampered by inadequate funding for energy infrastructure upkeep and enhancements, which exacerbates these problems. Electricity outages are thus common and protracted throughout the nation, resulting in inadequate quality of service, revenue damage for people and companies, and a detrimental impact on economic growth. Unreliable electricity rates, which are frequently insufficient to cover operating expenses and do not encourage utilities to run effectively, make this issue even worse. Also, the regulatory environment for the electrical sector in Sierra Leone is inadequate. The present system is archaic and frequently results in inefficiency, fraud, and a lack of accountability. Companies and residents are directly impacted by these weaknesses in the Sierra Leonean energy sector as well as the country's inconsistent and poor-quality power supply.

Given that there are various types of research on the unfair distribution of electricity, this study aims to put all the information into a single idea in order to understand the reasons for the unfair distribution of electricity in Sierra Leone. The objectives of the study are to investigate the root causes of the electricity shortage in

Sierra Leone, explore the factors affecting the supply of electricity, and finally, determine how sustainable development is affected by the shortage.

Research Question(s)

Using qualitative research methods, this study produces the main question of the research, which is

1. What are the contributing factors that result in an unequal distribution of electricity in Sierra Leone?

The Sub-questions that followed from this research include:

2. What are the factors affecting the electricity supply in Sierra Leone?
3. How do electricity outages affect sustainable development?

Significance of the Study

Sierra Leone has one of the lowest electrification rates in the world, with no more than twenty-two percent of the population having access to electricity. This study will contribute to the body of knowledge on the distribution of electricity in Sierra Leone. The findings of this study will allow for recommendations to address the country's ongoing power shortage by suggesting ways to improve power supply. Throughout this research, the study is interested in understanding, explaining, and analysing how electricity is distributed throughout Sierra Leone and recommending ways in which it is possible to increase access to it. The objectives of the research are to learn about the existing distribution of electricity in Sierra Leone, identify the main barriers to improving access to electricity; and recommend solutions for better power supply.

Methodology

Since there has been a severe lack of energy in Sierra Leone for a long time, the economy of the nation has suffered greatly. Understanding the reasons for this shortage and how it affects the population has attracted more attention in recent years. Clarifying these difficulties has been made possible in large part by qualitative research. For

instance, research has revealed that inefficiency and corruption are two of the key causes of Sierra Leone's electricity shortfall (Daly et al., 2017). Qualitative research has also emphasised how people's daily lives, including their capacity to work, study, and access healthcare facilities, are impacted by the lack of dependable energy. Additionally, studies have revealed that communities are utilising creative strategies to manage this problem, such as relying on generators or solar electricity. In general, qualitative research offers insightful understanding of the intricate social and economic factors behind Sierra Leone's energy crisis and suggests prospective solutions for resolving this pressing problem.

This study uses a qualitative research methodology. Qualitative research is a viable methodology for this study since it can offer an in-depth analysis of the research question. A better understanding of the research issue is the aim of this study, and qualitative research can provide detailed descriptions of the study. Through qualitative research, the history and culture of the research location will also be better appreciated. By employing a qualitative research methodology, the study can examine the research question in a more pertinent and detailed manner. By utilising qualitative research techniques, the researcher will be able to create a thorough description of the research issue, appreciate how it fits within the setting and culture of the study's site, and gain a better understanding of the root causes of the findings. Because it may give the researcher a comprehensive understanding of the research issue, qualitative research is the best methodology for this study. Additionally, by using a qualitative research approach, the researcher can learn more about how people engage with one another in the research environment and have a greater perception of how individuals from various backgrounds view the topic under investigation. Additionally, qualitative research can shed light on the interactions between many social, economic, and political aspects that affect the research topic. Utilising fresh viewpoints and ideas, qualitative research adds to already existing knowledge while also having the ability to influence future research on this subject.

Data Collection

The data collection process for this study consists of data from secondary sources. They include official documents, journals, articles, publications, newspaper reports, websites, and expert opinions. Secondary sources provide first-hand accounts of events from the past or present that can be used as reliable data sources. Secondary sources offer first-person accounts of historical or contemporary occurrences that can be trusted as data sources. When collecting data from secondary sources, the researcher carefully evaluates the implications of their findings because they are aware of any biases or mistakes that might have been included in these sources. The chance that material is provided in a biased way or that other factors may affect the accuracy of the researcher's results is also considered. This indicates that the researcher goes beyond verifying the reliability and quality of their data while gathering and evaluating information from secondary sources, including checking for accuracy, utilising numerous sources, and cross-referencing findings with other sources. To guarantee that the data presented is reliable and impartial, the researcher also considers any cultural, political, or economic distinctions between their own culture and the one from which the secondary sources originate. Furthermore, the researcher takes into consideration any modifications that may have developed over time and is conscious of any impacts or inconsistencies in the data from secondary sources. To sum up, the researcher is aware of the need to meticulously analyse and confirm data obtained from secondary sources to assure authenticity and dependability. Concerning collecting data on electricity usage, the researcher considers the ethical implications of such data collection, particularly in terms of privacy and security. As a result, the researcher ensures that the data gathered is accurate and reliable based on the sources from which it was gathered.

Data Analysis

An analysis is done thematically on the data collected from secondary sources. This research lays emphasis on the analysis of the energy sector, electricity distribution, demand and supply, energy policy, and sustainable development, followed by suggestions for ways of achieving the supply of efficient, reasonable, and sustainable electricity. There were some concepts that were taken into consideration while

collecting data for this study. They include the energy sector, electricity distribution, causes of electricity shortages, factors affecting electricity supply, and the impact of electricity shortages on sustainable development.

Limitations of the study

The limitation of this study includes, above all, the inability to do field research or conduct interviews with experts in Sierra Leone and reliance on using secondary sources to collect data. The case study environment is currently suffering from an electricity shortage and a poor Wi-Fi connection, making it difficult to conduct any form of interview or complete online questionnaires. However, the information gathered through the desk-based study will provide a good overview of the challenges currently facing Sierra Leone in the energy sector. In addition to the study's limitations, there is a lack of access to reliable data regarding the national energy consumption and power supply situation in Sierra Leone.

Definition of terms

Energy justice: is described as the goal of achieving equity in access to energy.

Energy policy: a policy made by the government (or energy sector) to address energy production, distribution, and consumption.

Biomass: a plant-based generated energy material used to produce heat or electricity.

Thesis Structure

In the introduction section of this research, the concept of energy justice is discussed. The concept of energy justice seeks to address the challenges of energy access and distribution with an emphasis on the marginalised groups who are ignored in energy distribution. This study explores the underlying factors of electricity shortages by examining the Sierra Leonean energy sector, the electricity system, demand and supply, tariff management, and the effectiveness of Sierra Leone's energy policy followed by the impact and consequences of electricity shortages. In Chapter One, this thesis introduces the study by discussing the background, statement of the problem, the purpose of the study, research questions, and significance of the study furthered by the

methodology used for the research, limitations, definition of terms, and the thesis structure. A thorough literature review on the Sierra Leone energy sector, energy efficiency, the organisation, and various sub-sectors of the Sierra Leone electricity system is also conducted in chapter two. This chapter examines the availability and utilisation of various renewable energies, as well as energy policy and the structural framework. The assessment of the relationship between electricity supply and sustainable development and, finally, previous related research is discussed in this chapter. Further, chapter three aims to answer the main and sub-questions that emerged from this research accordingly. This chapter includes analyses of the root causes of electricity shortages, the factors affecting electricity supply, and the impact of electricity shortages on sustainable development. Meanwhile, in Chapter four, an in-depth discussion is done on the limitations of the energy sector, the challenges of the electricity system, and the consequences of electricity shortages. In Chapter five, the conclusion section of this thesis summarises the findings of the research, adds the limitations, and makes recommendations.

CHAPTER II

Literature Review

Theoretical/Conceptual Background of the Study

Limited electricity distribution in Sierra Leone has been a topic of discussion for years. Multiple challenges have been experienced by the nation's energy sector, including limited infrastructure, restricted access to electricity, and high tariffs. With the goal of enhancing the energy industry, the government of Sierra Leone has undertaken initiatives to tackle these problems. But the country still has quite a distance to go before attaining equal electricity distribution. Insufficient funding for energy infrastructure is one of the key causes of the unjust distribution of power. Due to inadequate facilities, many communities in Sierra Leone have limited access to dependable energy, which makes it challenging for residents to obtain fundamental services like healthcare and education. Furthermore, extravagant costs make it challenging for households with limited incomes to afford electricity. The corruption in the energy sector is another aspect causing the issue. There have been allegations of authorities mismanaging funds intended for enhancing the energy industry, which has increased inequities in the distribution of electricity. All the country's stakeholders must work together to make a determined effort to address these problems.

The unfair distribution of electricity in Sierra Leone is a complex issue that requires a comprehensive theoretical or conceptual framework to understand. The energy situation and energy policy approach are one of the frameworks that looks at how political and economic issues interact to influence resource distribution. This approach considers the political influence of elites and interest groups on electrical policies and decisions, as well as the impact of elements affecting the supply of power, such as energy structures and resource availability, on the availability of electricity. The social justice approach is another concept that focuses on the moral standards of fairness and equity in resource allocation. This approach would consider the effects that uneven access to electricity has on various social groups and how policies may be created to encourage greater social justice. Ultimately, this study considered the historical, cultural, and institutional context from which this issue arises as a framework to frame

it. By doing so, the study would be able to gain a more nuanced understanding of this complex problem and develop effective solutions that address its root causes.

The Sierra Leone civil war finally ended in 2002 after eleven years of civil unrest, and since then, both past and current governments have made progress on the post-war reconstruction amendment (Peters, 2013). However, several factors are hindering this effort. There are several factors contributing to this, such as mass unemployment, escalating crime rates, poverty, and the unequal distribution of resources. The country's socio-economic growth has been interrupted by the disruption of public infrastructure during the civil unrest and the dysfunction of existing infrastructure due to a lack of proper maintenance. Rebuilding these infrastructures is a daunting task for the new government, and many have argued that inadequate electricity has undermined the country's ability to achieve this objective. To help address this problem, the government needs to embark on major programmes for energy access. To achieve this goal, it will need to take several steps to improve efficiency in the use of energy and the development of renewable energy sources. It was estimated in 2015 that only fourteen per cent of Sierra Leonean households had access to electricity (OECD & World Health Organization, 2018). The current government is working to improve this situation by increasing access to electricity in rural areas and expanding the use of renewable sources of energy. While these efforts are welcome, the government has a long way to go if it is to achieve its objective of universal electrification by 2025. According to Koroma & Rongcheng (2009), many rural villages still do not have access to electricity, and it is estimated that about eighty per cent of the population lives in these villages. Without access to electricity, these communities are unable to meet their basic needs and are condemned to a life of poverty. The residents of these communities suffer from a lack of basic services such as clean water and adequate healthcare, and their prospects for a better future are extremely limited. Because of this Jalloh (2017), indicates that to ensure that these communities can gain access to electricity, the government must undertake several measures to increase the efficiency of its use of energy and develop renewable energy sources. The government also needs to devise a plan to provide the residents of rural communities with a reliable supply of electricity.

Implementing these measures will improve the lives of the people of Sierra Leone and ensure that they can obtain adequate levels of health care and education.

The inability of the existing power plants to keep up with the rising electricity demand is one of the factors causing the electricity shortage in Sierra Leone. Therefore, the energy sector relies on expensive generators for electricity supply. However, diesel generators are expensive and unreliable, making it difficult for residents to access basic services and for companies to operate (Himer et al., 2021). Also, according to the Sierra Leone Country Guide (2020), the energy sector has not received adequate funding. It has led to a lack of funding for the maintenance of the existing facilities and the construction of new power infrastructure. In addition, the nation frequently experiences blackouts because of ageing infrastructure and inadequate distribution systems. Moreover, Chukwu et al. (2021), indicated in their journal article that the absence of the facilities needed to effectively transmit electricity throughout the nation, especially in remote regions, is another problem influencing electricity scarcity in Sierra Leone. Therefore, this makes it challenging for locals to access electricity and strains the current power grid.

The definition of energy justice is the fair and equal implementation of rights throughout systems of energy provision, access, and related environmental services. It motivates scholars to conduct more in-depth research than just looking at technical or engineering fixes for energy system issues (Jenkins et al., 2016; McCauley et al. 2013; Welton & Eisen 2019). Energy justice is also a useful tool for comprehending how racial or ethnic background, gender, and other disparities interact when it comes to the systems, infrastructures, and policy-making that regarding the systems, infrastructures, and policymaking surrounding energy (Heffron et al. 2018; McCauley et al. 2019; Sovacool et al. 2020). Several studies have attempted to reflect these interconnections in the electricity problem in Sierra Leone. However, due to the vast nature of several existing research on energy situation in Sierra Leone, this study will try to put together all the information into a single idea which is to address the concept of energy justice for the unfair distribution of electricity in the nation of Sierra Leone. This study uses the energy justice framework to understand how the policymakers in the country views energy situation, energy efficiency, energy sectors, energy demand and supply followed

by renewable energy, energy policy and the link between electricity supply and sustainable development. This allows it to evaluate the difficulties associated with energy policy and assist in making useful recommendations (Heffron et al. 2018; Jenkins et al. 2016). For instance, Marlin-Tackie et al. (2020) contends that their research on energy justice indicates that it is crucial to strengthen local governance to properly address fracking. According to Moniruzzamman & Day (2020), energy justice framework has helped to identify new policy processes to local decision-making in Bangladesh. The Democratic Republic of the Congo's (DRC) hydroelectric programme includes suggestions for monetary reimbursement from Kruger and McCauley (2020).

A well-established "trade-off"-based understanding is presented in the policy literature on energy justice (Gunningham 2013; Kosai and Tan 2017; Oliver and Sovacool 2017). The main goal is to strike a compromise between interdependent policy objectives that are in conflict (Shah et al., 2021; Song et al., 2017, and Sprajc et al., 2019). To better capture trade-offs, analytical tools like the energy policy trilemma have been used in both quantitative studies (Heffron et al. 2018). It has not yet been used in qualitative field studies, though. According to research on the energy policy trilemma in relation to justice, there are three crucial interconnected goals involving enhancing safeguarded energy supply in energy production systems, enhancing electricity availability and access to clean cooking solutions to reduce poverty, and commitment to promoting ecological responsibility and sustainability (Heffron et al. 2018; McCauley 2018). Energy justice refers to a worldwide energy system that fairly distributes the expenses and benefits of energy services and that is tasked with making neutral and informed energy decisions. The numerous injustices that different social groups are subject to can be identified using the energy justice model (Heffron et al. 2018; McCauley 2018).

Energy justice contends that fairness and equity are equally important to the energy situation in African nations as is access to electricity. Multinational businesses that put profit over the needs of local communities frequently run the energy infrastructure in these nations today. Environmental deterioration, health issues, and socioeconomic inequity are the results of this. The proponents of energy justice demand for a move towards locally owned and operated renewable energy sources that put the

needs of disadvantaged groups first. This would increase access to energy while simultaneously fostering employment growth and sustainable development. However, to achieve energy justice at the national and international levels, political will and systemic change are needed. It also necessitates tackling problems like corruption, a lack of transparency, and unfair resource allocation. Considering these obstacles, grassroots organisations and social movements that call for a more just and equitable energy system for all are driving the growth of the campaign for energy justice in Africa and around the world. This movement recognises that energy access is a fundamental human right and not just a matter of practicality. It attempts to ensure that everyone has access to affordable, dependable, and sustainable energy sources, regardless of location or financial situation. Finding ways to minimise our reliance on fossil fuels and taking the environmental impacts of energy production and consumption into account are further components of energy justice. To do this, investments in renewable energy and increased energy efficiency are required. The ultimate goal of energy justice is to guarantee that everyone has access to affordable, clean energy that satisfies their basic needs and promotes their well-being.

According to Blimpo 2019, the number of people in Sub-Saharan Africa that have access to electricity is below average; about forty-three percent have access to electricity which is below the eighty-three per cent global electricity access rate. As there is no stable public electricity supply in most regions, fossil fuel power machines are used as an option to produce electricity. For lighting, paraffin, handy lights, or candles are commonly used. About a quarter of the population cooks with firewood or charcoal. There is considerable potential for the use of renewable energy, especially solar and hydroelectric energy. The utilisation of renewable energy, particularly solar and hydroelectric energy, has a lot of promise. To lessen the environmental effects of using these non-renewable sources, which currently meet a sizeable portion of the region's energy requirements, there is a need to move to renewable energy sources. In addition to providing a sustainable solution to Africa's energy demands, renewable energy sources also help to reduce the pollution and greenhouse gas emissions brought on by the combustion of fossil fuels. By granting access to energy sources that are less expensive and more dependable than conventional fuels, the utilisation of renewable

energy sources can also aid in lowering the rate of poverty. Since having access to power can significantly enhance living circumstances and economic prospects, energy justice is a key problem in these areas. However, numerous municipalities may find it difficult to adopt renewable energy strategies due to the high cost. Programmes for sustainable energy in these regions need to be prioritised by governments and international organisations in terms of funding and assistance. Campaigns for education and awareness can also serve to highlight the advantages of renewable energy sources and persuade people to switch to greener energy habits. It is possible to improve humanity's standard of life while lowering carbon emissions and safeguarding the environment by increasing access to dependable and sustainable power in underdeveloped areas.

A critical concern in Africa's energy sectors is energy justice. Over a billion people live on the continent, but many of them still lack access to secure and reasonably priced energy (Daly et al., 2017). The effects on social well-being, health, education, and economic growth are significant. likewise, women and children are particularly impacted by energy poverty since they are frequently in charge of gathering firewood and using open flames to cook their meals, which exposes them to dangerous pollutants. An efficient sector will result in appropriate management of the energy system, hence more investment is required in each country's energy industry to address this problem (Foster & Witte, 2020). As a result, energy justice will be promoted and everyone will have access to cost-effective and dependable electricity. Additionally, while making sure that they are held responsible for their activities, governments should emphasise policies that promote private sector involvement in the energy industry. To exchange knowledge and assets on the best practises in energy management, African nations also need to work together more. Finally, it is important to support energy-saving education and awareness initiatives to persuade people to adopt sustainable lifestyles that consume less energy. Africa can provide a more fair and sustainable energy future for all of its population by putting these ideas into practise. Policies should be put into effect to ensure that communities who are marginalised have access to these resources (Jalloh, 2017). This entails taking steps like creating microgrids to service rural areas and giving subsidies to regular families. It is also vital to prioritise local community involvement in

the decision-making processes related to energy development initiatives. As a result, there is a greater chance that their expectations will be granted, and they will benefit from the ensuing economic opportunities. To accomplish energy justice in Africa's energy sectors, governments, participants in the business sector, civil society organisations, and locals will ultimately need to collaborate (Hirmer et al., 2021). African governments and foreign partners are aiming to increase access to sustainable energy sources like solar, wind, hydroelectricity, and geothermal power to tackle this dilemma. These initiatives are essential for lowering carbon emissions and lessening the effects of climate change in addition to increasing electricity access. However, increasing access to sustainable energy sources alone won't be enough to achieve energy justice in Africa. This is due to the intimate relationship between energy access and other development objectives including reducing poverty, promoting education, and promoting health. As a result, it's crucial to take a comprehensive strategy for energy availability that takes into account its social, economic, and environmental implications. This entails making investments in energy-efficient technologies, encouraging the use of renewable energy, and bolstering regional organisations that can aid in the creation of environmentally friendly energy systems. The transition to clean energy should also take precautions to prevent vulnerable groups from being left behind. African nations may build a more just and sustainable future for all of their population by implementing a thorough strategy that covers the various aspects of energy justice.

Some of the most energy-accessible populations in the world are found in Africa. The continent does, however, also have a wealth of renewable energy sources that might offer long-term remedies for energy poverty (Goldenberg, 2002). African nations have improved their energy efficiency efforts significantly in the last few years, with a focus on encouraging clean and inexpensive energy sources. This has been motivated by the need to lessen greenhouse gases and combat climate change as well as the aim to give everyone access to dependable and reasonably priced energy. With an emphasis on ensuring that all communities have equitable access to clean and inexpensive energy sources, energy justice has emerged as a significant idea in Africa's efforts to improve its energy efficiency. Dealing with issues of injustice and social exclusion, which are frequently brought on by unequal access to energy resources, is

necessary. African nations are implementing policies and strategies that encourage the growth of renewable energy, raise investment in clean technology, and enhance access to funding for renewable energy initiatives to attain this objective (Busch et al., 2019). One of the biggest barriers to Africa's efforts to improve its energy efficiency is the production and distribution of electricity. Due to the continent's weak infrastructure and insufficient funding of modern energy amenities, this has occurred (Patel, 2017). Another challenge to energy efficiency in Africa is the expensive cost of alternative energy technology, which prevents many people from purchasing them. However, there are opportunities for Africa to go over hurdles and become a leader in renewable energy. The continent, for instance, is abundant in natural resources that can be exploited to generate renewable energy, such as hydro, sunlight, and wind. Foreign financiers are also becoming more interested in supporting renewable energy projects in Africa. African nations must prioritise the construction of cutting-edge energy facilities and establish an environment that encourages private sector investment in clean energy if they are to take advantage of this potential. Administrations, business sector players, and civil society organisations will need to work together and demonstrate strong political will to achieve this. Africa can contribute to global efforts to mitigate climate change while also achieving its aim of environmentally friendly energy for all with the correct policies and investments in place. By implementing cutting-edge technology like smart grids and storage mechanisms for energy, this problem is being addressed. Decentralised energy systems, which may deliver dependable power to isolated and neglected populations, are also receiving more attention. The need to address energy efficiency in buildings and industry is a crucial component of Africa's transition to sustainable energy. Specifically, this entails putting in place energy-efficient building rules, encouraging the use of efficient appliances, and supporting business practises that reduce wasteful consumption of energy. Additionally, there is a need to promote behaviour change towards more sustainable practises and increase consumer and company knowledge of the advantages of clean energy. In general, Africa's efforts to create clean, affordable energy are essential to accomplishing its sustainable development objectives and raising the standard of living of its people.

Energy justice is a crucial problem for both the supply and demand of energy in Africa (Waldron & Hacker, 2020). There are many energy-poor villages on the continent, and many people live without access to electricity. The effects of this access barrier on health, education, and economic growth are enormous. An equitable transition to sources of clean energy that emphasises the needs of marginalised populations is necessary for combating energy poverty. This transition must be made without worsening already-existing inequities or introducing any new ones, though. Affected populations must be included in the development of policies, and all partners must be involved in decision-making processes. Additionally, steps to increase energy efficiency and cut waste must be taken in combination with developments in alternative energy sources. The main causes of energy poverty, such as inequality and a lack of access to money, knowledge, and technology, must also be addressed. We can only achieve true energy justice for Africa's energy supply and demand by confronting these fundamental problems. The disparity between those who can obtain reliable, inexpensive electricity and those who can't is known as energy justice. Inequalities already present are typically exacerbated by this imbalance, which frequently has an excessive effect on marginalised populations. The demands of such populations must be given top priority to achieve energy justice, and it is crucial to make sure that they are involved in the formulation of energy policies. This includes supporting economically disadvantaged households' access to financing and contributing to community-led energy-efficiency projects. Additional measures to enhance education and information sharing should be launched to reduce the energy access gap. Energy justice must be attained through a multidimensional strategy that addresses the demand and supply aspects of the equation as well as the underlying social and economic issues that lead to energy poverty.

Transition is a critical issue that demands quick action. There are many renewable energy sources in Africa, including geothermal, hydro, wind, and solar energy (Andre et al., 2020). However, fossil fuels continue to provide a significant amount of Africa's energy needs. This contributes to climate change and worsens energy inequality and poverty. Ensuring that everyone has access to dependable, affordable, and clean energy services is the aim of energy justice. Additionally, it aims to enhance

social equity and environmental sustainability in the energy sector. If energy justice in Africa is to be accomplished, the development and utilisation of renewable energy sources must be prioritised (Busch et al., 2019). Administrations and corporate sectors must provide funding for the required infrastructure and expertise to effectively employ these resources. This will improve the economic position in addition to reducing carbon dioxide emissions. The accessibility of energy services for underprivileged regions should also be improved. Africa can reach its full capabilities as a pioneer in clean energy development and an advocate for energy justice for all by taking an integrated strategy that places a high priority on environmental sustainability, social equity, and economic development. Several steps must be made to achieve energy justice in Africa's transition to renewable energy. Initially, frameworks for policy and regulation that encourage the deployment of renewable energy sources are required. Governments should support renewable energy projects with subsidies and tax advantages while gradually eliminating support for fossil fuels. secondly, the industry of renewable energy requires a fostering of capacities and expertise. Community members will be able to take part in the design, implementation, and oversight of clean energy initiatives thanks to this. This inclusiveness will improve the use of alternative energy sources. Additionally, research and development are required to spur innovation in the field of renewable energy. New, more effective, affordable, and sustainable technology and solutions will result from this. To encourage investments in and the use of renewable energy sources, governments, the private sector, and civil society must work together (Patel, 2017). This will guarantee a concerted effort is made to realise a low-carbon future. Furthermore, programmes to raise public knowledge about the advantages of renewable energy and the harmful effects of fossil fuels on the environment are necessary. This will increase demand for renewable energy and motivate people to embrace sustainable lifestyle choices. Lastly, international cooperation is required to tackle issues like energy security and climate change. To ensure equal access to clean energy for all, nations should collaborate to develop policies and strategies that encourage funding in and adoption of renewable energy sources.

The implementation of energy policy in sub-Saharan Africa has been hindered by limited resources, poor infrastructure, and unstable political environments (Kpognan,

2022). Nonetheless, Hirmer et al. (2021), argues that there is a chance to enhance the effectiveness of the region's energy strategy given the rising need for energy and the possibility of renewable energy sources. Given the severe poverty and lack of electricity in the sub-Saharan region, energy policy is an important problem that requires to be addressed. For the region to raise living standards and encourage economic progress, it is crucial to establish efficient and economical energy sources (Valickova & Elms, 2021). Since much of the current energy policy is ineffectual, energy policy is therefore the most important issue that various administrations in the region must reform. Authorities must give energy policy reforms priority since a shortage of affordable and dependable electricity is impeding regional economic growth and development. Ensuring that everyone has access to electricity, entails making investments in renewable energy sources and upgrading infrastructure. This is crucial in sub-Saharan Africa specifically because the continent has the lowest rate of electrification globally and mainly depends on fossil fuels to provide its electricity. To ensure that everyone has access to clean, cheap energy, a sustainable energy policy is required.

Africa's energy policy must prioritise energy justice. The continent's natural resources are plentiful and can be used to supply all of the energy required by its inhabitants. Access to electricity varies significantly among various populations and geographical areas, though. Africa must implement policies that support an equal allocation of energy resources and guarantee that those who are most at risk, such as women, children, and the poor, have access to cost-effective and dependable energy services. The complicated socioeconomic and political situation of Africa makes it difficult to implement energy policy from the perspective of energy justice. Unreliable supply, high energy costs, and unequal access to energy are just a few of the problems that afflict Africa's energy sector. These problems are more obvious in rural locations where there is expensive and little access to electricity. People's capacity to access education, healthcare, and other important services is significantly impacted by the absence of access to energy in these locations. Likewise, many people find it difficult to purchase necessities like food and housing due to the high cost of electricity. According to energy justice experts like Michoud & Hafner (2021), African energy policy is a critical issue that needs to be addressed right away. This is due to the fact that, despite

the numerous energy policies implemented by different African governments, their efficacy is still up for debate. Another critical aspect of energy justice is ensuring that energy policies are inclusive and participatory. Energy justice advocate for the participation of all energy related issue because according to Garba & Bellingham, 2021, an inclusive energy decision making can promote the effectiveness of energy policy. Therefore, Governments must engage with local communities and stakeholders to understand their unique needs and perspectives on energy issues.

Innovative strategies and solutions are required to address this issue because more than six hundred million residents in the region lack access to power. The lack of resources and staff makes it challenging to implement energy policy and strategic objectives. Numerous energy-related enterprises in the area are understaffed and undertrained. As a result, the energy ministries and other various entities must immediately strengthen their energy-related operations. The region's growth is being hampered and its potential is not being realised due to a shortage of trained employees in the energy sector. Development in training and education programmes will be essential to tackle this issue and create qualified personnel that can support the expansion of the sector.

Tomala et al (2021), indicated in his publication that the various legislatures of sub-Saharan African states must enact cost-based energy pricing if they want the operation and resources of the power authorities to be sustainable in the interim. It is intended that cost-based power pricing may both encourage consumers to use electricity more responsibly and decrease waste while also ensuring that the power authorities can pay their operating costs and make investments in new infrastructure. Yet, difficulties with financing, insufficient infrastructure, and political turmoil in some nations make it difficult to implement such measures. Also, for sub-Saharan Africa's energy issues to be resolved successfully, there is a need for regional coordination and cooperation. This is especially relevant in sub-Saharan Africa, where there is often insufficient and unstable access to energy. Numerous individuals can live better lives and the region's economy can thrive by implementing an appropriate energy policy.

The "Electricity Sector Reform Roadmap" by 2030 lays out a strategy to reorganise the electrical sectors of African states like Ivory Coast, Gambia, Guinea,

Liberia and Sierra Leone to accomplish the long-term objective of the electrification project. Nevertheless, as this objective has not yet been legally adopted, neither Nation's Energy Policy nor the Strategic Plan Sector's existing energy initiatives are progressing (Kalra et al., 2020). The informal adoption of the Electricity Sector Reform Roadmap could cause subsequent electrification success criteria to be missed and impede the expansion of existing energy projects. The energy strategy and sector strategic plan must be in alignment with the strategic plan to produce a dependable and economically viable power industry. To maintain the long-term viability and profitability of the energy sectors, it is essential to carefully examine and include all pertinent aspects, such as market demand, technological improvements, and environmental issues (Kalra et al., 2020). African nations need to develop policies that promote energy justice to address these issues. This includes putting rules into place that guarantee all citizens, irrespective of socioeconomic position, have equitable access to energy services. Increasing the ability of individuals with more experience to start the necessary energy policies for expanding access to energy. Ultimately, it is necessary to address the political issues that influence uneven access to energy by encouraging accountability and openness in the sector's management. Africa can guarantee that its residents have access to dependable and inexpensive energy services that can enhance their quality of life by giving energy justice a high priority in the implementation of its policies.

Electricity and Sustainable Development

Concerning Africa's flourishing natural resources, most of its occupants do not have proper shelter, clean water, electricity, or other essential requirements to assist with impelling its populace into sustainable development (Kalra et al., 2020). This problem, which is sadly widespread, has stopped the region from fully using its natural resources, which has resulted in the region's marked underdevelopment. Even though one of Africa's biggest advantages continues to be its natural riches, several issues have stopped it from achieving the amount of growth that would have been viable with the correct policy and infrastructure in place. These problems include political unrest, crime, a lack of access to healthcare and education, poor infrastructure, and restricted financial resources. For Africa to realise its full potential and fully use the economic

potential of its abundant natural resources, all these concerns must be resolved. Inadequate access to contemporary technologies, scant agricultural funding, lack of access to energy, and pervasive poverty all exacerbate these problems (Vezzoli et al., 2018). Availability of electricity is pivotal to ensuring sufficient food, housing, clothing, water, education, and healthcare, all of which are significant perspectives for tending to poverty reduction and achieving sustainable development (Koroma & Rongcheng, 2009). A reliable power supply can provide provincial and metropolitan areas with an unlimited range of recent events. This can be a more reasonable method for reducing unemployment (Pearce & Webb, 1987). According to Cecelskie (1996), an uninterrupted power supply is related to a range of financial solutions. They include poverty reduction, population development, urbanisation, and opportunity for women and their families. A low power supply can hinder a nation's development. The low power supply can limit access to electricity, which is essential for economic growth, education, and healthcare. Without it, companies cannot operate efficiently, hospitals cannot function adequately, and students cannot study effectively (Hysa et al., 2023).

Electricity supply is a modern global instrument for achieving sustainable development since it allows for more efficient energy use than wood and coal (Mzini & Muhiya, 2014). In turn, this limits access to many services, such as healthcare and education, and is a significant barrier to attaining sustainable development goals. Because energy is now a need, a country's rate of development might be significantly slowed down if there is a shortage of it. Therefore, for nations to achieve their objectives of achieving sustainable development, the problem of insufficient electricity supply needs to be addressed. Several factors, such as insufficient funding, a lack of infrastructure, and outdated technology, have made it challenging for developing nations to supply the power demand. The Governments must invest in the creation of the infrastructure required for delivering dependable electrical services to address the issue of insufficient electricity supply. To fulfil the rising need for electricity, this entails making investments in clean energy sources including solar, wind, and hydropower as well as building new power plants. Governments must also put more effort into expanding the grid's infrastructure and boosting electrification rates in rural and remote areas to improve access to electricity. Governments must also spend money

on research to discover new, more effective technologies that can be utilised to generate electricity. Energy is essential for human development in areas such as healthcare, clean water, education, and the provision of lighting and clean cooking solutions (IEA Report, 2019). The people who reside in the nation could have access to power through the implementation of these changes. The improvement in economic and educational outcomes brought about by this access to electricity would also improve people's living standards in developing countries. These African governments must also act to improve their nations' access to power. Doing so will boost their chances of achieving sustainable growth.

Access to affordable, reliable, modern energy services is essential for sustainable development (Tracking SDG7, 2021). This is because providing efficient energy service to remote regions provides multidimensional benefits. They include economic opportunities, gender equality, improved healthcare facilities, and a standard schooling system (Patel, 2017). Energy technologies can increase energy access in rural communities throughout developing countries and boost economic stability and sustainable development (Patel, 2017). Energy-related technology can thereby enhance the living standards and health of people. Energy technology adoption in these regions is crucial for socioeconomic development since eradicating poverty depends on having access to affordable, dependable energy sources. Communities cannot create basic infrastructure, and construct and operate institutions, healthcare, and communication systems without access to electricity. Access to energy can lead to improved education, communication, and economic prospects. Moreover, the adoption of energy technologies may enable urban and rural areas to produce food and goods of greater quality, boosting earnings and lowering unemployment. For those who are poor, these advantages of access to energy are crucial since they frequently mean the difference between survival and total destitution. However, these potential advantages must be evaluated against the effect’s energy production has on the environment and the hazards to one's health and safety posed by using specific fuels, such as biomass and fossil fuels. Before any energy development projects, it is important to consider the wider effects that power generation has on nearby communities and ecosystems. Although energy technologies can significantly improve rural areas, it is also essential to be aware of the

hazards they can provide to guarantee that both the advantages and the problems can be evaluated.

Sustainable development emerged as a global concern in 1970 with the publication of the Limits to Growth Report (Patel, 2017). In contemporary times, the concept of sustainable development is related to the sustainable availability of energy (Vezzoli et al., 2018). A study conducted by Rogelj et al. (2017) on "Sustainable Energy for All" establishes the significance of how achieving energy objectives could play a vital role in attaining sustainable development. One of the aspects of transitioning towards sustainable development is an efficient supply of electricity. According to El-Ashry (2005), sustainable energy is the frontier for achieving sustainable development. An efficient power supply can thus reduce dependence on imported fossil fuels and contribute to economic stability. Most energy policy paramount objectives are energy efficiency, whereas energy access serves as a pillar for sustainable growth (Ganda & Ngwakwe, 2013). The world energy system is changing rapidly due to changes in technology, policy imperatives, and changes in the economy and politics (Tomala et al., 2021). The transition towards sustainable development requires improvement and innovation across all levels of the energy sector. These changes should comprise interrelated energy policies to move regions closer to a better future (Caragliu & Graziano, 2021).

The energy situation in sub-Saharan Africa requires improvement if only the region wants to achieve sustainable development. Electricity is essential for sustainable development in Africa. To increase access to electricity and lessen reliance on fuel machines, which are costly and harmful to the environment, it is necessary to make improvements in the power sectors. For African nations to accomplish the United Nations Sustainable Development Goals, especially those related to reducing inequality and alleviating poverty, it is crucial to provide affordable and dependable energy. The governments must increase energy supply and distribution, make strategic investments in the power industry, ensure the availability of dependable, cost-effective renewable energy sources, and increase public awareness of energy efficiency to accomplish this. There are several ways to do this, including altering the cost of electricity, providing financial incentives to the private sector to invest in energy projects, and enacting laws

that encourage the efficient use of electricity. By reducing energy poverty and expanding access to electricity, these measures will assist these countries in moving towards a sustainable future. Governments must prioritise investments in cutting-edge energy infrastructures such as distributed generation and demand response technology to improve the energy supply. As a result, expanding energy transmission and distribution is required in Africa to guarantee that residents of rural areas have access to electricity. Upgrade the administration's policy structures and increase the effectiveness of electricity systems; this will require advancements in contemporary technology. Only then will reliable, affordable electricity be available in all areas of the continent. The growth of renewable energy sources would lessen reliance on expensive and polluting power generators, which currently supply most of these nations' electricity to many regions.

Energy efficiency in Africa is significant to sustainable development. The governments must acknowledge energy efficiency as an element of the economic development plan if they are to realise the aim of providing access to power for every resident. To help implement these policies and build a sustainable energy infrastructure, it will be necessary for the governments to collaborate with the private sector. However, if the region's energy demands are not improved, it will be challenging to achieve sustainable development. As a result, governments must commit to enhancing energy efficiency throughout the whole economy to guarantee that their nations' energy needs are satisfied in a cost-effective and environmentally friendly manner. New initiatives should include lowering total demand and improving power consumption sustainability. This indicates that to create laws and regulations that will encourage energy efficiency and minimise energy waste, governments must collaborate with pertinent parties.

The infrastructure gap is not just affecting individuals but also blocking job creation, poverty reduction, an advanced schooling system, improved healthcare facilities, and sustainable development (Busch et al., 2019). All these elements are necessary for any developed society, but the lack of adequate infrastructure makes it impossible for such societies to exist. Lack of access to essential services like power, safe drinking water, and sanitary facilities, as well as slower economic investment and development, are just a few of the negative effects of the infrastructure gap that are

being felt throughout the African region. Additionally, individuals in rural areas and those with low incomes have been particularly negatively impacted by the infrastructure gap since they frequently lack access to vital resources and the infrastructure required for development. Because of the infrastructure gap, these populations are more susceptible to poverty and run a greater risk of being socially and economically excluded. This emphasises even more how crucial it is to fill the infrastructure gap to guarantee that all populations have access to the resources and services required for development and a healthy lifestyle. Governments must invest in infrastructure programmes and develop policies that specifically target the people who are most impacted by the infrastructure gap to bridge it and ensure fair access to resources. Both social and physical infrastructure, such as access to facilities for healthcare and education, should be included in these initiatives. Proper renewable energy management and policy implementation will direct electricity production and distribution. The region is still experiencing energy deprivation despite its rich natural resources. The continent's energy system requires improvement to meet the energy demand and promote sustainable development goals (Jalloh, 2017).

Previous Related Research on Sierra Leone

A study conducted by JICA (2009) investigated Sierra Leone's power supply in comparison to previous research on the energy situation in Sierra Leone. According to their findings, the MEWR should conduct a feasibility study on the electricity sector of the country, since the last research conducted on the nation's power sector is over thirty years old, and the study should focus on the impact of power supply on the social, economic, and environmental aspects of the country. This study's objective is to evaluate the power sector of Sierra Leone to understand and inform the nation's decision-makers of the potential benefits and pitfalls they may encounter while making decisions regarding electricity generation, supply, and consumption. As part of this study, an analysis of the current state of electricity generation, supply, and consumption was conducted to understand the potential benefits and pitfalls the nation could experience. They went further to recommend that more funds should be invested in the energy sector to stabilise the power supply.

Further research on electricity access in Sierra Leone was conducted by SE4ALL (2013). In their investigation on energy availability, they discovered that only a tiny portion of the country had access to electricity. The study found that, because of the lack of electricity in these communities, residents in rural areas were particularly challenged and only had access to an irregular supply. Since it hampered their progress in areas like education, health, and the economy, not having access to electricity created a tremendous problem for those living in rural areas. The study also found that the lack of power harms people's safety and security in rural locations by increasing their susceptibility to illegal activity. The researchers claim that urgent government action is required to address this problem and guarantee that residents of remote areas have access to secure and dependable energy sources. Again, they found out that not more than one per cent of the households in the country use modern energy for cooking and that less than thirteen per cent of the citizens access reliable power in their homes. As a result, they recommended that to bridge the gap between the population that has access to electricity and those that do not, the energy sector must ensure all districts are supplied with power. Also, the power system must target a universal power supply by 2030, followed by improvements and the implementation of clean cooking strategies. Additionally, they recommended the improvement of the electrification of various homes, including an upgrade of power distribution options like solar in hard-to-reach localities. The introduction of stoves for charcoal and biogas is a splendid recommendation for this study.

Moreover, from the research conducted by Jalloh (2017) on the Sierra Leone energy sector, it is learned that the country's energy sector requires huge work if they want to meet the growing power demand. This study claims that the lack of a reliable power supply is one of the leading factors in the nation's continued underdevelopment. Therefore, measures must be taken to improve the electricity generation capacity, along with the creation of current transmission and distribution lines, to increase energy access. The need for the improvement of renewable energy is a key finding of this research. Although the electricity tariff is high, the first recommendation made by this study is that the tariff is adjusted so that it is affordable for all. The second is to improve access to electricity in rural communities, followed by the energy sector's development

of the rate of power generation to align with the demand and supply of power. With the numerous energy potentials in the country, the study recommended much attention be given to the improvement of renewable energy. A regulatory framework to improve policy implementations on electricity supply.

In general, the research conducted by Kalra et al (2020) on increasing energy access in Sierra Leone discovered that the power supply in Sierra Leone is slow. Also, the inflated cost of tariffs is preventing equal access to electricity. According to the study, one challenge in the country's electricity distribution is the centralization of power supplies in the Western Area while neglecting the provinces. The creation of support programmes for the energy sector is encouraged by this study. Supporting the provinces' energy industries can help maintain a consistent and sustainable supply of electricity, lower transmission losses, and help lessen regional inequality. Additionally, the government may guarantee increased access to electricity and boost national economic development by supporting the energy sector in the provinces. Given the fact that females are given the responsibility of getting wood, which is an insecure and challenging work, women and children are most impacted by the shortage of access to power in rural regions. According to similar research by the Sierra Leone Country Guide (2020), people in rural regions rely on firewood as their primary energy source since it is inexpensive and more affordable for households to use firewood than it would be to use electricity, which has a high price. They rely on biomass despite its drawbacks because electricity is so expensive. With household expenditures already challenging, it is challenging for households to pay for necessities like education and health care. The researchers recommended that the governments of Sierra Leone prioritise giving rural areas access to electricity, providing funds for the energy infrastructure, and lowering electricity costs.

CHAPTER III

Electricity Distribution in Sierra Leone

Causes of Electricity Shortages in Sierra Leone

This chapter is a discussion of the findings of electricity distribution in Sierra Leone. It provides an overview of the country's electricity problems and the causes of electricity shortages, including mismanagement, ineffective energy policy, dependency on imported fuel, imbalanced power supply, centralization, and low installed power capacity. It also discusses the factors affecting electricity supply from the perspectives of insufficient funding, limited modern technology, an unstabilized electricity tariff, insufficient power supply machines, limited trained and qualified personnel, insufficient energy infrastructure, and marginalised renewable energy, followed by limited private sector investment and a lack of accurate energy data. It discusses distribution issues and the need for the government to provide adequate electricity infrastructure in remote areas. It further discusses the unequal allocation of electricity and the impact of an electricity Shortage on sustainable development in Sierra Leone.

Following the end of colonial rule, most of Sierra Leone's official activities occurred in the capital city (Dumbuya, 2015). As the country's population grew, more government and private activities were required for developing the hinterland, and the need for electrification emerged, but the mature power capacity made it challenging to supply efficient power to these rural communities and urban areas simultaneously. This endeavour to provide power for all resulted in a binary measure of electricity shortage, in which the entire nation could not be connected at once.

The Sierra Leone Civil War, which ranged from 1991 to 2002, was a terrible battle. The Revolutionary United Front (RUF), a rebel organisation that aimed to topple the government and seize control of the nation's diamond mines, engaged in combat with the government of Sierra Leone (Dumbuya, 2015). Throughout the battle, the RUF was responsible for a number of crimes, including mass rape, mutilation, and the forced enlistment of children as soldiers. Foreign mercenaries and private military firms that were contracted by both sides to offer military support also took part in the conflict. In 2002, the government and the RUF reached a peace agreement that put an end to the

conflict. The impact of the conflict may still be felt today, as many individuals in Sierra Leone are still struggling with its physical and psychological toll. Despite this, there have been initiatives to promote justice, peace, and development in Sierra Leone that works to rehabilitate and unite the populace. According to estimates, the fighting claimed the lives of nearly 50,000 people, while countless others were displaced or forced to leave their residences. The conflict also had enduring effects on the economy since it damaged the mining and agriculture sectors and increased levels of poverty. Furthermore, the grief and mistrust that the conflict left behind have made it challenging for the nation to go forward. Limited infrastructure is another significant effect of the conflict, as many governmental, commercial, and communal infrastructures were destroyed as a result of its effects. Considering these obstacles, Sierra Leone has made strides recently towards reconstruction and peace. To tackle the war's ongoing repercussions and guarantee a peaceful future for all Sierra Leoneans, however, significant work still needs to be done.

The eleven years of civil war in Sierra Leone led to the mass relocation of citizens to the city, resulting in the consolidation of the urban area. The war also destroyed several power plants and electricity connectivity equipment. The country's energy infrastructure has been severely strained by overpopulation as well as damage to power stations and electricity transmission infrastructure, resulting in frequent power outages and uneven power distribution across the country. Electricity scarcity makes it difficult for companies, educational institutions, and healthcare facilities to operate. This has a significant impact on national growth and population. The country's growth has been significantly hampered by the electricity disruptions, which have also increased the cost of essential items and made life even more challenging for the populace. Also, because individuals find it difficult to survive and some are forced to take severe measures only to get electricity, it has increased social and fiscal insecurity. The increase in population disrupted the urbanisation of the western area and the development of other parts of the country. Providing electricity is part of the developmental process, but the energy sector had more demand than it could meet. Due to the rapid population growth and limited infrastructure, the electricity sector is unable to meet the growing demand for power, which is causing blackouts in the western area.

The system has been under additional stress due to insufficient resources to meet the increasing demand as well as inadequate upkeep and improvements to the existing infrastructure, leading to a scarcity of electricity and an unstable power supply. The pressure on the energy sector to provide power to both areas resulted in an imbalanced supply of electricity and a decline in its distribution.

Mismanagement of the power supply system is one of the root causes of frequent blackouts in Sierra Leone. The government has not been able to manage the electricity supply in various regions of the country because of its inadequacy to effectively address and manage variations in electricity demand and power supply, which is one of the main contributors to blackouts in the country. A UNDP (2018) report found that little progress has been made in the provision and supply of power in Sierra Leone. Citizens with access to electricity or personal supply machines can improve their educational and health status. The average citizens that are unable to acquire such comfort face challenges in accessing electricity and, as a result, boycott the legal means of connecting to electricity, which in turn affects accurate power supply (Anderson & Beresford, 2019). These hazardous techniques of increasing the human population might precisely diminish the region's stability. Electricity shortages are caused by an inability to improve access to efficient energy. Studies have revealed that there are differences in customs, norms, rituals, and values between Sierra Leone's various regions. Because of their different concepts, citizens tend to disregard legal means of connecting to power. The failure to administer regulations on providing and distributing energy by the government is contributing to the power shortage in Sierra Leone (VCA, 2013). Most of the power generated does not reach its intended beneficiaries because the government has not been able to administer the existing assets appropriately and effectively. Because of this, there is now a substantial disparity between the quantity of electricity delivered and the quantity that is being consumed by households and companies, resulting in nationwide blackouts.

The nation's old and deteriorating electrical infrastructure frequently causes blackouts that can continue for hours or even days. Government corruption has stolen money that could have been used for upgrading the energy sector and the government has not made sufficient investments in doing so (Daly et al., 2017). Additionally, there

is a lack of openness in the management of the electrical sector, with contracts frequently going to those with political clout rather than competent businesses. Customers now find themselves without consistent access to energy, which hinders economic growth and makes poverty worse. One of the primary reasons why there are so many power outages in Sierra Leone is the inability of the GoSL and the supply system to control the power system (Hirmer et al., 2021). In Sierra Leone, the absence of dependable power access has turned into a significant barrier to economic development and the fight against poverty (Daly et al., 2017). Due to the government's ineffective management of the power infrastructure and the scarcity of qualified firms, consumers face frequent blackouts and unstable service. Businesses have been significantly impacted by this, especially those in the manufacturing and service industries, which depend on reliable electricity supplies to run efficiently. Additionally, homes frequently have prolonged power outages, which makes it challenging to complete daily tasks like studying and cooking. The inability to provide consumers with necessities like lights and air conditioning hurts service-based industries like restaurants and hotels. Healthcare facilities are also impacted, which makes it difficult for medical staff to deliver quality care. It is obvious that having reliable access to power is important for both people and companies, and efforts must be taken to tackle this issue. The GoSL and stakeholders must work together to make a coordinated effort to invest in the infrastructure and enhance management procedures to address this issue. This calls for increased sector-wide accountability and openness, as well as a willingness to put the requirements of customers ahead of political considerations. To increase the dependability of the electricity supply, the GoSL must give investments in the power sector top priority and collaborate with capable firms. This would not only promote economic development but also raise everyone's living standards in Sierra Leone. Then and only then can the GoSL hope to give its people dependable access to power and pave the road for long-term growth.

Ineffective Energy Policy implementation is among the leading root causes of the unfair distribution of power in Sierra Leone. Sierra Leone's legislative body has approved several energy bills (Hysa et al., 2023). They include the National Electricity Act of 2011, the National Energy Policy of 2009, the Renewable Energy Policy of

Sierra Leone 2016, and the Energy Efficiency Policy of Sierra Leone 2017 (SLCG, 2020). Due to the ineffective implementation of these policies, the energy policy for transmission and distribution is inadequate, leading to gaps in the energy framework. The lack of accessibility and service quality in energy transmission and distribution networks is indicative of the ineffectiveness of energy policy. The limitation of rules and regulations in energy transmission and distribution is leading to a gap between the possibility and actuality of energy transmission (SLCG, 2020). It is difficult to verify that the energy sector is truly delivering the service it advertises due to its limits of oversight and enforcement of energy regulations. Stringent rules and regulations must be established to guarantee that the energy transmission and distribution systems are up to date. The execution of energy policy must be adequately supervised and enforced. An adequate energy policy should be put in place to encourage the power company to develop innovative technologies and build a more effective energy network. It will help ensure the electricity company fulfils its promises, reduces energy bills, and promotes energy efficiency (Dumbuya, 2015). It would also be advantageous to put in place stronger enforcement mechanisms to make sure that the power company is held responsible for its activities. This would guarantee it is not exploiting its users and offering poor-quality service. Consequently, there would be an increase in consumer and industry confidence in the power company, which would be advantageous for all parties involved. If utility companies were appropriately encouraged, they would not only have the drive to invest in innovative technology and boost efficiency but also be compelled to implement more responsible strategies. Governments can help increase energy providers' accountability and dependability by putting in place improved regulatory policy and the right incentives. The success of any policy requires a dynamic implementation strategy; failure to exhibit dynamism leads to an adverse impact on the policy. Overall, the energy sector will become more stable and sustainable as a result, increasing people's access to reasonable energy.

Dependency on imported petroleum is another cause of frequent blackouts in Sierra Leone. Due in large part to its reliance on petroleum imports, Sierra Leone has struggled with regular blackouts for decades (Daly et al., 2017). The nation is primarily dependent on thermal power plants, which need a lot of fuel to produce electricity

(SLCG, 2020). However, the nation's government has struggled to meet demand because of the high expense of importing petroleum. The annual cost of importing petroleum is enormous. One of the main causes of the nation's frequent blackouts is the GoSL's dependence on fuel imports, which is made worse by the annual rise in fuel prices and the paucity of fuel. Conversely, the other difficulties with electricity delivery are made more difficult by the scarcity of fuel. Sierra Leone bought around ten point five thousand dollars in petroleum gas in 2021 (OECD & World Health Organization, 2018). Petroleum gas is among Sierra Leone's most-imported goods. Petroleum gas is mostly imported by Sierra Leone from Belgium and the United Arab Emirates (UAE). According to AFREC's energy balance 2020, Sierra Leone has a total primary energy supply of 3134.1 ktoe. A rough estimate states that traditional biomass makes up eighty-five per cent of all energy used (Koroma & Rongcheng, 2009). Only a minor portion of the energy consumed is made up of modern energy services like electricity, petroleum products like LPG, and non-biomass renewable energy. Overall, energy consumption and energy imports are more in Sierra Leone than they are in the country. Natural gas is not produced locally, and Sierra Leone lacks an oil refinery. Currently, all petroleum products are imported. Numerous factors contribute to the country's frequent blackouts, but the high dependency on fuel importation is among the main culprits. The inability of the government to prioritise electricity supply has led to ageing infrastructure and a lack of capacity to fulfil the rising demand for electricity (Koroma & Rongcheng, 2009). Furthermore, the issue is made worse by the difficulty of producing electricity from alternative sources, such as diesel generators, due to fuel scarcity. Due to high fuel prices and unavailability, this has prevented individuals who can afford power generators from using them during blackouts. Limited investment in renewable energy sources like solar and wind power, which could offer a more sustainable solution to the nation's energy needs, further exacerbates the problem. There is a need for further investment in the electricity sector to address this problem, including improving existing infrastructure and looking into alternative energy sources. Not only will this increase access to electricity, but it will also boost the economy by generating jobs and lowering reliance on imported fuels.

Furthermore, the country's administration's failure to recognise geographical and socioeconomic inequality is a major cause of Sierra Leone's electricity shortage. The distribution of resources in Sierra Leone is inequitable, with most of the electricity generated going to the country's capital city while the population living in remote regions lacks access to electricity, leading to a glaring disparity in terms of who has access to power (UNDP REPORT, 2017). The challenge of supplying energy to rural areas is exacerbated by their remote location, insufficient infrastructure, and expensive costs. This exacerbates the country's already-existing socioeconomic inequality by leaving many rural residents powerless and widening the access to electricity divide between rural and urban areas. Because of this negligence, some regions have not developed as much as they should, leaving a sizable portion of the nation with subpar infrastructure, unstable electricity networks, and insufficient access to energy sources. Electricity shortages in some areas of the country are only made worse by such geographic and socioeconomic differences. The government struggles to balance resources due to regional differences and constraints. (Bouzarovski & Petrova, 2015). The country's failure to provide adequate electricity infrastructure in remote areas has resulted in an unequal distribution of resources. This inequality has caused several people, especially those in remote communities, to be excluded from accessing necessities such as electricity.

Electricity shortage and supply inequity are typical manifestations of energy injustice wherein residents of specific regions are unjustly restrained in their capacity to attain the comfort of electricity (Daly et al., 2017). The supply and demand of energy are not balanced due to a variety of contributing factors. One of the most significant of them is that the nation's energy demands cannot be met by much of the infrastructure used for energy generation and transmission. There is a considerable disparity between those who have access to electricity and those who do not since the energy sector has not made improvements in the technology and infrastructure needed to provide energy access to its population. Sierra Leone faces challenges due to ineffective corporations, limited education, and expensive healthcare (Jalloh, 2017). The demand for energy in Sierra Leone will only rise as the country's population expands, making it even more necessary to develop modern infrastructure and technologies. To adequately modernise

its energy infrastructure, the country must develop innovations that will maintain its existing infrastructure and encourage private companies to undertake power-supplying projects. To ensure that everyone takes advantage of the benefits of dependable and reasonable electricity, Sierra Leone must intensify its efforts to provide access to energy in remote and rural areas. These upgrades would help the country move towards a more sustainable energy system, opening jobs and economic opportunities for the locality as well as establishing the foundation for successful development, improved healthcare, educational reform, and demographic change. As a result of these initiatives, the living standards of Sierra Leoneans will increase, allowing them to benefit from the social and economic benefits of a stable energy supply.

The centralization of energy activities in the western area is one of the major causes of power shortages. There is an inequality in the flow of energy, with an overabundance in the West and a shortage in the provinces. The urban area is where most of the essential power supply services are located. Due to the limited infrastructure in the provinces of the nation, rural and remote households have less access to energy, which has increased the disparity between urban and rural communities (UNDP REPORT, 2017). Because of this, the distribution of energy is uneven, with urban areas having better access and rural regions having less privilege. Rural areas' industries have been negatively impacted by the uneven distribution of power, leading to a decrease in output. The well-being and security of people who live in rural areas have been negatively impacted by this inadequate infrastructure and access to energy. One of the biggest issues that must be solved is the shortage of electricity in rural and remote sections of the nation, which has an enormous impact on both economic growth and quality of life. To solve this problem, the GoSL must improve infrastructure and reallocate finances to rural areas to provide them with the same resources and services as the urban area. This advancement would ensure that rural communities have access to power on par with urban areas, allowing them to boost productivity and provide essential services to their populations. In addition to improving access to vital services like healthcare and education, improved power availability would also enhance the well-being and security of people living in rural areas. Additionally, investing in rural electrification would boost economic growth since easier access to energy would create

new jobs and sectors that depend on electricity. Funding regional development would improve the quality of life for those who live there while also guaranteeing that they had access to similar services and resources as those who live in cities (Hirmer et al., 2021). Because it would lessen reliance on non-renewable resources and contribute to emissions reduction, this greater access to power would also positively impact the environment. Therefore, investment in rural electrification has positive effects that should not be undervalued. Hence, improvement in rural electrification is crucial to raising living standards for those who live there while also promoting long-term economic growth, social advancement, and environmental protection. Rural electrification projects provide long-term financial and social benefits, as well as reduced reliance on biomass fuels and improved access to energy amenities.

Electricity shortage and supply inequity are typical manifestations of energy injustice wherein residents of specific regions are unjustly restrained in their capacity to attain the comfort of electricity (Apple, 2011). The supply and demand of energy are not balanced due to a variety of contributing factors. One of the most significant of them is that the nation's energy demands cannot be met by much of the infrastructure used for energy generation and transmission. Sierra Leone faces challenges due to ineffective corporations, limited education, and expensive healthcare. The demand for energy in Sierra Leone will only rise as the country's population expands, making it even more necessary to develop modern infrastructure and technologies. To properly manage its energy infrastructure, the country must develop innovations that will maintain its current infrastructure and encourage private companies to undertake renewable energy projects. To ensure that everyone takes advantage of the benefits of dependable and reasonable electricity, Sierra Leone must intensify its efforts to provide access to energy in remote and rural areas.

The low installed power capacity is hampering the power supply in Sierra Leone. The current installed capacity is insufficient to supply the population of the country. At present, Sierra Leone has 99.6 installed capacity to serve its entire population (SLCG, 2020). The increase in capacity cannot be supported by the existing infrastructure due to its age. The limited funds available to the energy industry, which restricts its ability to carry out the urgently required infrastructure maintenance and

upgrades or to build new infrastructure where it is absent, makes the problem even worse. The administration must respond swiftly to guarantee that infrastructure is improved and maintained to fulfil the population's rising demand for electricity. The government must put energy-saving technology into practice, expand funding for power supply sources, and encourage public-private collaborations to find innovative sources of electricity. These options could guarantee that the citizens of Sierra Leone have access to the energy they require and lessen the burden on the nation's current infrastructure. As a result, the GoSL must consider the development and maintenance of energy infrastructure as a top priority to guarantee that its citizens have consistent access to electricity at a reasonable cost. Lowering poverty, increasing economic growth, and improving healthcare, education, and well-being are essential for reducing destitution (Azapagic, 2004). The short-term financial commitment will be necessary, but long term, these investments may have a substantial effect on the economy and general growth. To further the nation's development, the government of Sierra Leone must concentrate on modernising the nation's energy infrastructure. The administration may generate employment and foster long-term population growth by ensuring energy infrastructure and modernisation priority. Doing so can promote the country's economic growth.

Despite all forms of scarcity, power scarcity has been regarded as a form of energy injustice, and the injustice is magnified when marginalised localities are ignored in power distribution (Apple, 2011). This is because the goal of energy justice is to ensure a fair access to safe and reasonable energy. Power shortages are made worse by failing to account for marginalised areas when distributing power, which also compounds the sense of unfairness felt by those who are impacted. This is because the marginalised are disproportionately affected by power outages due to their already limited access to basic infrastructure and services. It is important to address the power shortage that marginalised communities face to ensure their right to a fair living standard and equitable opportunities, as well as to reduce the injustice of uneven access. Addressing electricity shortages in underserved regions would lessen suffering while also making a positive contribution to a more equitable society.

Factors Affecting Electricity Supply in Sierra Leone

Electricity supply is essential for economic and social development. Modern services like healthcare, water provision, and hygiene cannot run effectively without energy (Hirmer et al., 2021). However, transmission and distribution, followed by consumption, have an impact on the state's development. Several causes have been related to the electricity shortage in Sierra Leone. The ineffective implementation of energy policies, insufficient developments in power generation, the under-utilised natural resources for hydro-power generation, and the inefficiency of the country's current energy sources have all contributed to the scarcity of electricity in Sierra Leone (SLCG, 2020). The provision of efficient electricity and adequate modern energy remains challenging in Sierra Leone (Davidson & Sokana, 2001, Farinelli, 1991, Johannson & Goldemberg, 2002). The country is in its developing stage, and the cost related to the affordability of modern energy is huge (UNDP, 2017).

Notwithstanding the causes of the frequent blackouts in Sierra Leone, there are factors affecting the constant power supply in the nation that is causing these outages of power. Foremost among them is Insufficient Funding. The outbreak of the Ebola virus in 2014 and Covid-19 in 2020 pandemic made the country experience more setbacks regarding electricity supply as huge funds were used to combat the deadly virus that was killing many citizens (Dumbuya, 2015). This made it challenging for the government to maintain the infrastructure for providing electricity, which led to regular blackouts across the nation. Instead of continuing to increase the electricity supply, these resources were used to fund medical staff and quarantine facilities, among other health services. The outbreak of both viruses made it more challenging for the nation to advance regarding energy distribution because of the unexpected increase in electricity demand brought on by the considerable number of healthcare institutions that required electricity (Coy et al., 2021). This unexpected rise in electrical demand put a significant strain on the already meagre electrical supply, causing frequent outages and interruptions. Public and private sectors in the nation were compelled to use alternative energy sources, such as machines, which increased financial pressure. To make matters worse, because of the monetary limitations brought on by the Ebola and Covid-19, the GoSL was incapable of allocating any further funding to upgrade the energy

infrastructure. Limited electricity supply caused a reduction in economic growth and development, leading to productivity losses and increased fuel costs. The healthcare system is severely impacted by the loss of energy, with many institutions unable to provide adequate care. Poor energy infrastructure and access to reliable energy sources have reduced the living standard for many citizens. People in rural and distant areas are disproportionately affected by the power outage. Powerlessness is a major barrier to raising living standards and expanding access to healthcare. Without access to competent medical treatment, several people are left in precarious situations, and the absence of power seriously hampered the nation's ability to thrive economically. The government faced difficulty in finding a practical way to address the electrical problem and ensure all inhabitants had access to reliable energy. To tackle this issue, the government and the energy sector had to devise ways that would not only make electricity accessible to all but would also offer affordable and long-term solutions.

Modern technologies are being used to provide a reliable power supply, but Sierra Leone still has limitations to efficient power supply due to limited modern technology. There are limited modern power supplying technologies available in the country and this is one of the factors affecting efficient and consistent power supply in the nation (Daly et al., 2017). Modern technologies need to be deployed in Sierra Leone to ensure a consistent supply of electricity. For these technologies to guarantee a reliable and sustainable source of electricity, renewable energy sources like solar and wind power would be necessary (RENS, 2021). To transfer electricity reliably and effectively, it would also be required to modernise the nation's infrastructure. Although it would be a challenging task, upgrading the system and creating renewable energy sources may significantly improve the living standard in Sierra Leone. Once the innovative technologies are put into use, Sierra Leone will be able to access a dependable source of power. Because energy poverty has long been a problem in the country, this would significantly alleviate it. Several development efforts, such as improved agricultural sector, healthcare and education services, will be made possible by this increase of power supply. A significant step towards improving the quality of life for its residents would be the deployment of a modern, renewable electricity network in the country. Sierra Leone can transition to a sustainable energy future that is

cleaner and more dependable than the present by utilising innovative technologies to increase power supply. Sierra Leone may replace its old, ineffective, and reliant on imported fuel power systems with modern energy technologies. Citizens would be able to obtain power for a fraction of the cost due to the use of advanced technologies. Utilising contemporary energy technologies could also lessen Sierra Leone's dependency on imports, fostering employment creation and local economic development. Modern technologies may also aid in lowering the nation's greenhouse gas emissions, enhancing air quality, enhancing public health, and lowering the dangers associated with climate change. Just a few of the advantages of contemporary technology for Sierra Leone are listed here. Sierra Leone might be well on its way to a healthier and more affluent future by investing in the creation and use of contemporary technologies. Sierra Leone might become more energy independent while reducing the negative environmental effects of its energy output by using modern energy sources extensively. Additionally, Sierra Leone can improve the productivity of its industrial and agricultural sectors, resulting in higher-value commodities with less harm to the environment. In effect, this could improve the country's general well-being and global competitiveness, generating jobs and assisting in the fight against poverty. Sierra Leone must address access to technology, fund research and training, and improve working conditions to modernise its infrastructure and industrial methods. Along with promoting economic growth and alleviating poverty, these initiatives would provide Sierra Leoneans with the chance to take advantage of the expanded opportunities that technology offers.

The electricity tariff is a major factor affecting the electricity supply in Sierra Leone. GoSL and the energy sector are struggling to stabilise the electricity tariff. This is because of factors such as increased operational and supply expenditures, a rise in electricity demand, and limited sufficient revenue to cover expenses. The government must take measures to stabilise the electricity tariff and solve income shortfalls to ensure the sustainability of the electricity supply. The Sierra Leone Electricity Regulatory Commission (SERC) was created by the government to regulate electricity rates in the country. To ensure that electricity suppliers receive sufficient funds, SERC oversees power tariffs and establishes fees that will be affordable to consumers. This is to ensure

that consumers can have a reliable energy supply at a reasonable cost and that electricity distributors can cover the costs of operations and capital expenditures. The energy sector must consider the affordability of consumers in rural areas and establish a power tariff that is accessible to them. Subsidised tariffs should be offered for rural areas to ensure a reliable power supply. The development of electrical equipment, which will assist in reducing electricity usage and reduction of cost, should go hand in hand with subsidies for rural areas' utility bills. The administration should also ensure electricity providers can get a fair return on their expenditures while continuing to offer users secure and affordable electricity. The government should act to guarantee that energy tariffs are adapted to the physical and economic variations between urban and rural areas to balance the demands of both power suppliers and consumers. According to research conducted by Kalra et al (2020), rural localities prefer to spend funds on biomass, kerosene, and lanterns as options for cooking and lighting because of the unstable electricity tariff.

Demand for power connections is increasing due to population growth, and energy alternatives will improve if the electricity tariff remains unstable. The fact that many rural dwellers cannot afford power tariff rates is an indication of the electricity challenge in Sierra Leone. Notwithstanding, demand exceeds the supply of electricity because the collective demand of households, industries, businesses, and public institutions exceeds the small capacity installed power in the country (Jalloh, 2007). Electricity bills have grown, and outages have resulted from a lack of power to fulfil demand from the public. The people have suffered due to the high cost of power bills and the lack of a reliable power source. Because of this erratic access to power, which has slowed economic growth and lowered living standards, the country has suffered considerably. To boost the capacity of the power sector and provide people with more dependable access to electricity, the government must increase energy supply and production. The government requires measures to ensure that electricity is reasonable for every citizen to improve the capacity of the electricity infrastructure. To guarantee that residents have access to electricity at an affordable price, the government of Sierra Leone and the energy sector should pursue a policy of subsidising electricity. Citizens

will be able to utilise energy without paying a great deal of money, which can increase economic growth and improve living standards.

Insufficient electricity supply machines are preventing the smooth operation of the power sector and providing uninterrupted electricity to customers. A significant obstacle to the efficient activity of the power sector and the provision of dependable and affordable electricity to clients is the shortage of power supply machinery (Hadjipaschalis et al., 2009). Numerous issues, including inadequate capacity planning, poor maintenance, and an increase in electricity consumption, contribute to limited electricity supply machinery. Because of these problems, there has not been enough equipment to keep up with the rising electricity demand, leading to regular electricity interruptions in the nation. Electricity suppliers should concentrate on the improvement of their machinery and infrastructure to ensure they can deliver a dependable power supply to solve this issue. Also, for the energy sector to maintain the existing power supply machines, it is necessary to emphasise regular maintenance. Therefore, to ensure the power-supplying machine can meet the current power demand, the energy sector management should also engage in capacity management. As a result, for the power supply to be improved, newer power transmission and distribution equipment is needed.

Limited maintenance is another factor affecting the power supply in Sierra Leone. The government cannot maintain the electrical system due to limited funding, which has resulted in regular shortages and disturbances. The aftermath of the civil war has left power stations and electric connecting equipment inoperable. Power conservation is a challenge for the energy sector in Sierra Leone. The energy sector cannot produce and preserve power in sub-sectors for an emergency response to power outages. Conservation of the nation's hydropower resource is needed to ensure its future. The government of Sierra Leone must make significant investments in repairing and modernising the country's current hydropower infrastructure to overcome the difficulties associated with energy conservation. Therefore, the government must collaborate with localities to spread public knowledge of energy conservation. To conserve waterfalls during the rainy season, more structures need to be constructed by the government. During the country's other seasons, hydro water can be used to produce electricity. Sierra Leone can further its efforts to address the problem by improving new

infrastructure, enhancing current infrastructure, and collaborating with neighbourhood groups to encourage energy conservation and public awareness of the problem.

Limited trained and qualified personnel in the electricity area is affecting the power supply in Sierra Leone. A substantial number of inexperienced personnel disturbed the operation of the power sector (Hadjipaschalis et al., 2009). Due to limited staff, outages have increased in frequency and length, leaving households and companies without electricity for extended periods. The instability in Sierra Leone's electricity sector is due to a shortage of skilled personnel, which has reduced the supply's dependability and reliability. Due to corruption and inefficiency brought on by this shortage of employees, the electricity sector has suffered substantial losses. The power sector has struggled to keep up with technological advancements due to limited skilled workers, which has caused repair costs to soar. Together with the increasing operating cost for the electrical sector, this constituted a serious threat to the citizens of Sierra Leone. Due to limited employees, the power industry has also been unable to implement crucial structural changes, which has caused reliability and quality to further decline. There have been significant effects on Sierra Leone's electrical system because of this staffing deficit (Daly et al., 2017). The impact on Sierra Leone's social and economic development includes the decrease in the availability of dependable, high-quality power. In addition to depriving many regions of Sierra Leone of reliable and high-quality power, limited professionals have had a noteworthy influence on the sector's operating costs. As a result, a sizable section of the population in Sierra Leone lacks access to stable and high-quality power, which limits their access to economic opportunities and living standards.

Electricity infrastructure is essential for all power-supply-related operations. Limited infrastructural facilities are also affecting the electricity supply in the country. The eleven years of civil unrest led to the destruction of several energy infrastructures (JICA, 2009). Most remain unrenovated and only a few energy structures have been developed in the country. Most of the existing infrastructural facilities for electricity supply are old and need to be replaced, not only in the western area. The existing infrastructures cannot meet the rising demand for electricity, leading to an energy crisis. The government must modernise the infrastructure and construct brand-new electricity

facilities. The government must also allocate sufficient funds for constructing new infrastructure to guarantee a reliable and consistent electricity supply. Therefore, it requires setting up high-voltage transmission lines, building new power plants, or implementing energy-efficient technology. The government could safeguard the country's energy future and ensure a consistent and reliable electricity supply by updating the infrastructure and constructing new facilities (Chukwu et al., 2021). The government should concentrate on developing energy efficiency and conservation to provide the necessary funding.

Despite the several renewable energies available in the country, they remain underutilised. Renewable energies like hydro, solar and wind are available in the country. Renewable energy can be used to provide electricity in remote communities, but it is difficult to build power plants or hydroelectric stations. Remote towns suffer because of limited improvement in renewable energy sources since they cannot enjoy the benefits of cost reduction, environmental protection, and clean and efficient electricity that hydro, solar and wind energy can provide (RENS, 2020). As a result, it has become more common to use conventional electrical sources like carbon fuels, which has increased pollution in rural areas and reduced living standards. The government must continue to improve renewable energy sources to ensure that remote communities have access to safe, dependable, and reasonably priced forms of electricity. To ensure that people of these communities' access renewable energy sources, the government should also support research and development projects to improve renewable energy technologies. Therefore, to encourage the adoption of renewable energy sources in remote settlements, the government needs to invest in renewable energy sources (RENS, 2020). The government can reduce air and water pollution by investing in renewable energy sources and providing remote communities with affordable and dependable electricity. The government should also allocate funds to assist in maintaining renewable energy systems in distant villages. Investments in renewable energy sources can help isolated communities access renewable energy sources, reducing financial obstacles. Renewable energy would be a dependable and cost-effective choice for rural areas rather than an expensive substitute for conventional energy sources (Ranalder et al., 2021). As a result, communities would have access to

reliable energy sources from such initiatives, regardless of their financial situation or geography.

By and large, private investment in the energy sector is limited. A challenging scenario is this limited investment, which has been caused by the rise in recent years in electricity demand. It is mainly because electricity generation and transmission have always been a public sector obligation, which has prevented private corporations from receiving monetary support to participate in energy projects. This limited assistance can be related to the several challenges of the industry, including the need to invest in power plants, potential regulatory changes, and long-term price instability. Since there has been minimal private investment in the energy sector, there is a limited fund to develop new power plants despite the increasing need for electricity. Private enterprises lack financial incentives to invest in energy projects due to challenges in the industry. Ultimately, this results in a circumstance in which the public sector cannot finance the initiatives required to keep up with the rising power demand. Because of the absence of private investment, the public sector is responsible for providing funds for all energy projects. Unfortunately, paying for these initiatives has resulted in higher taxes and public debt. The fact that the public sector must fund projects that are not always economically feasible worsens the situation. The upshot has been a situation where public funds fail to produce returns, leaving taxpayers to foot the tab for these projects. The rising demand for public sector funding energy projects has been due to the limited private investment. The government of Sierra Leone must provide incentives and assistance for private companies to engage in energy projects. Despite being favourable in supplying funding to the public sector, these actions have not been enough to address the fundamental problem of limited private investment in the energy sector. Public-Private Partnerships (PPP), which allow private investors to participate in energy projects with lower risk, can help reduce the burden of risk on investors in the private sector. The PPPs constitute procedures to close the financial gap between the public and private sectors by enabling private enterprises to engage in energy projects while retaining control. Such collaborations might improve the quantity of private funding for energy projects and boost investors' financial security. However, the GoSL cannot attract foreign investors to improve the energy situation of Sierra Leone. The GoSL and

private investors have been unable to reach an agreement due to the government's failure to hold up its end of the agreement. For instance, according to a recent report on Sierra Loaded website (2022), the Karpower ship from Turkey at some point threatens to withhold power supply because of the huge outstanding debt owed by the GoSL.

The lack of accurate data on the energy system affects the supply of electricity in Sierra Leone. The energy sector cannot provide accurate statistics on the transmission and distribution of electricity (Chukwu et al., 2021). Without the ability to collect and report data on power distribution, there will be little or no knowledge of the country's electricity statistics. This limitation of information could have several economic and societal effects, including the inability to prepare for energy security and the cost of energy services. Governments and private entities alike will only be able to prepare for the future of energy use, supply, and pricing with accurate and reliable data on the energy sector (Chukwu et al., 2021). It will be challenging to pinpoint regions requiring upgraded energy infrastructure or utilising electricity inefficiently without accurate data. It will be challenging to monitor and evaluate how various areas of the country are performing concerning energy usage without accurate data. Unreliable data can limit efforts to reduce carbon emissions and other pollutants. Therefore, the government and private companies cannot make the necessary decisions and programs to increase energy use, upgrade infrastructure, or lower carbon emissions. Because there is an absence of accurate data, policymakers and other stakeholders may be unable to make decisions that will result in a more sustainable energy future. The energy sector and policymakers will be able to accurately evaluate the performance of energy-saving measures and investments in energy-saving infrastructure and projects by accessing accurate data that can be tracked and compared. As a result, precise and credible data should be available to make recommendations on increasing energy use and carbon emissions. It is hard to effectively assess the success of energy-saving policy and initiative without access to accurate data. As a result, for the energy sector and policymakers to make decisions about energy use and sustainability, the government and the private sector should ensure accurate data collection programs. Data is essential for managing Sierra Leone's energy resources, but a lack of reliable data is preventing a reliable supply and making electricity distribution problematic.

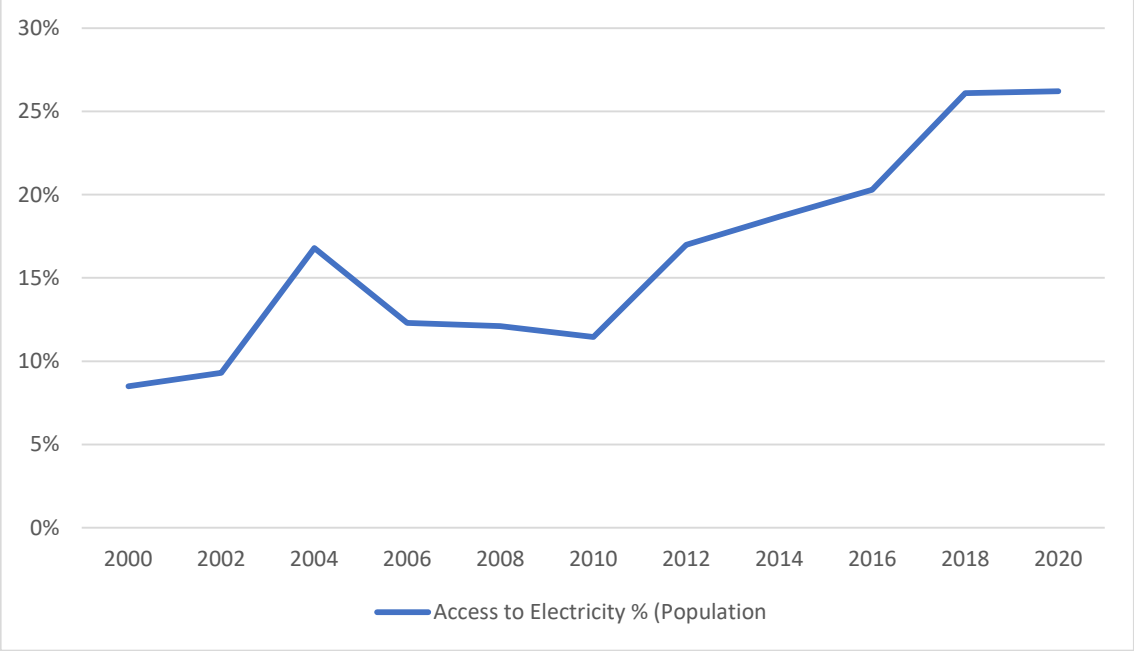
CHAPTER IV

Limitations of the Sierra Leone Energy Sector

The lack of a consistent energy supply is one of the main barriers to Sierra Leone's economic and social growth, and the country's energy demands are underfunded. With only about 105 MW available for a population of more than 7 million in 2018, the nation has one of the lowest installed power capacities per person in the entire globe (Daly et al. 2017). According to a UNDP (2018) assessment, the majority of the energy used in the nation comes from biomass, which accounts for 80% of total energy consumption. Wood combustion is the main source of biomass energy, followed by charcoal; according to the 2015 Population and Housing Census, 96.9% of homes utilised both types of fuel for cooking. Approximately 13% of total energy consumption comes from imported petroleum products, which is the next greatest source of energy for power generation. The Government of Sierra Leone (GoSL) has acknowledged that residents of the nation desperately require access to power. According to World Bank data (2018), only 2.5% of Sierra Leone's rural populace accessed electricity in 2016 and only 15% of the country's overall population does so currently. This is significantly lower than the average for Sub-Saharan Africa, which is 42.8%. Significant transmission and distribution network issues, which led to losses of 34.5% of the electrical supply in the Freetown Capital Western Area alone in 2017, further exacerbate the challenges of receiving electricity. An energy grid for the town of Makeni, a 33kV transmission line from Bo to Kenema, and a 161-kV transmission line running from the Bumbuna hydropower facility to the Freetown substation make up the national transmission system. The GoSL's top priorities continue to be boosting generating and enhancing the transmission and distribution network. The Sierra Leone Ministry of Energy has, in recent years, with assistance from ECREEE, Millennium Challenge Corporation (MCC), and other development partners, prepared several policy papers and proposals aimed at reforming the energy sector in an effort to address issues with power demand, additional generation, network rehabilitation and expansion, and access options (SLCG, 2020). The GoSL has indicated that it wants to increase the

capability of the regulatory bodies as part of its New Direction. It will be interesting to observe how these function in life.

Figure 1: Access to Electricity in Sierra Leone (% of Population)



Source: World Bank Data, 2023

Table 1: Sierra Leone Energy Sector Scan. National Electricity Estimates, 2017.

Population without electricity	5,800,000
Electrification (Total population)	5%
Electrification (Urban population)	11 %
Electrification (Rural population)	1% (2013)
Electricity (Installed generation capacity)	100KV
Electricity (From fossil fuel)	33.3% of total capacity (2012 est.)
Electricity (Hydroelectric plants)	66.7% of total installed capacity (2012 est.)

Source: Sierra Leone energy sector scan, National Electricity Estimates, 2017

The Ministry of Energy and Water Resources (MEWR) is responsible for the administration of the country's energy sector (Dumbuya, 2015). Electricity Distribution

and Supply Authority (EDSA) is the main body for electricity distribution in the country with Bo-Kenema power service (BKPS) the subordinate supplier body that supplies electricity to the township of Bo and Kenema respectively (Koroma & Rongcheng, 209). Bankasoka power service supplies the regions of the northern province. The principal energy generating source is renewable energy with the rate of 85% use, including biomass and hydropower, while the use of petroleum consists of 15% (UNDP, 2017).

All electricity supplies related matters including hydro and renewable energy are handled by MEWR which has the responsibility to produce and distribute electricity and water service in the country (Koroma & Rongcheng, 2009). However, there are other energy-related ministries in Sierra Leone. They include the Ministry of Trade and Industry (MTI) which is responsible for the marketing and sale of fossil fuels. Ministry of Agriculture, Forestry and Food Security (MAFFS) is responsible for food production and fuelwood. The Ministry of Mineral Resources (MMR) arranges all minerals and energy-related issues.

The importance of energy in poverty reduction and economic growth is well understood. In fact, it might be claimed that development goals will not be met until a persistent and determined effort is made to deliver modern energy to all sectors of the population of Sierra Leone. Thus, it is worth noting that the country lacked clear, thorough policies and strategies for the energy sector by 2009 (SLCG, 2020). Since 2001, there have been numerous attempts to develop the energy policy, but these efforts face challenges because the Cabinet and Parliament of Sierra Leone delayed adopting and publicising the National Energy Policy, which was expected to govern the process of energy provision and use in the nation. The absence of direction resulted in a variety of issues in the energy sector, including insufficient investment in renewable energy sources and inadequate energy distribution infrastructure. As a result, the country experienced frequent power disruptions and skyrocketing electricity prices. Consequently, the government began to create new policies and initiatives to promote renewable energy sources and enhance energy efficiency (Cemmats Group Limited, 2004). Adoption of feed-in tariffs for renewable energy producers, the launching of a national energy efficiency programme, and the formulation of a national renewable

energy action plan are among the efforts made. Although there have been some improvements in the last decade, there is a lot more to be done to ensure that the country's energy industry is sustainable, efficient, and reasonable for all citizens (Cemmats Group Limited, 2004).

The GoSL has pursued an energy strategy that places a priority on increasing the supply of electricity and developing renewable energy options as a substitution for power sources. The construction of an energy sector regulatory framework, encouraging private sector support in energy infrastructure, and promoting the use of alternative energy sources like solar and wind power are just a few of the steps the GoSl has put in place to attain this goal. Access to electricity increased from 5% in 2000 to over 20% in 2018 because of these endeavours (World Bank Global Electrification Database, 2018) (See Figure 1 above). The GoSL is trying to widen off-grid options like mini-grids and standalone solar systems to address this. Furthermore, initiatives are being taken to improve energy effectiveness and lessen reliance on fossil fuels. The ultimate objective of the nation's energy policy is to increase access to dependable and environmentally friendly energy while also fostering the country's economic development and environmental sustainability (Hysa et al., 2023). The policy's goals are to improve access to energy from its 10% in 2009 to 50% by 2025 and to reach universal access by 2030 (Sierra Leone National Energy Policy and Strategic Plan, 2009). The GoSL is taking a number of steps to do this, including investing in sustainable energy technologies including solar, wind, and hydropower. Also, the GoSL is striving to upgrade the country's thermal power plants and national grid to boost the country's energy infrastructure. Additionally, the programme seeks to advance energy efficiency through initiatives like encouraging the adoption of energy-efficient appliances and pressuring businesses to adopt more environmentally friendly procedures. To acquire funds for these programmes and to increase capacity in the energy sector, the GoSL is also collaborating with foreign partners. Ultimately, the country's energy strategy is an important step towards achieving sustainable development objectives and resolving urgent environmental issues. Two international agencies have provided funds to support the nation's energy policies: The World Bank and the United Nations Development Programme (World Bank Global Electrification Database, 2018). To lessen its

dependence on fossil fuels, Sierra Leone has been able to devote funds to infrastructure for alternative energy sources including solar and wind power. Similarly, the GoSL has implemented the Renewable Energy Policy and Energy Efficiency Policy to encourage private sector investment in energy efficiency projects, offering new business and economic opportunities (Busch et al., 2019). The nation aspires to achieve its goal of supplying energy to everyone by 2025 with the aid of these programmes. Many citizens' lives will be improved as a result, and it will also help the economy thrive and create jobs. It is crucial the nation maintains capitalising on these achievements and collaborates with global partners to expand its energy sector for the future. In doing this, the nation may contribute to international efforts to mitigate climate change while ensuring a sustainable future for future generations.

However, the GoSL's ambition to develop the country's energy situation by 2030 faces challenges. These challenges include poverty, unemployment, mismanagement, average education, and inadequate healthcare facilities. The nation is still working to make its natural resource management and funding for development more transparent. Infrastructure and poverty remain issues, despite the slight progress made. Sierra Leone has little installed capacity for producing power. Biomass and hydropower make up the majority of this (Dumbuya, 2015). Sierra Leone's energy demand is undersupplied, hindering its development. The energy sector has not been able to execute its responsibility accurately because of several limitations.

Foremost among the limitations of the energy sector is the limited policy implementation. The National Energy Policy was developed in 2009 to increase energy supply, demand, management, pricing, and infrastructure (Sierra Leone National Energy Policy and Strategic Plan, 2009). The policy aims to increase access to modern energy services for every citizen, promote the use of alternative energy sources, and improve energy efficiency. One of the key objectives of the programme is to increase the capacity of electricity production by building new hydroelectric infrastructure and promoting private sector investment in the area. Expanding access to clean cooking technology and fuels, such as liquefied petroleum gas (LPG) and better cooking solutions, which can assist improve health outcomes and lower indoor air pollution, is another significant goal. The initiative also highlights the necessity of enhancing

institutional capacity in the energy industry, including legal frameworks, the development of human resources, and public-private partnerships. In general, the National Energy Policy 2009 offers a blueprint for the long-term growth of the energy sector, putting an emphasis on enhancing the utilisation of cutting-edge energy services while minimising adverse environmental effects (Sierra Leone National Energy Policy and Strategic Plan, 2009). Following the implementation of the policy, the GoSL made some progress. The creation of the Rural Renewable Energy Agency (RREA), which has been crucial in giving rural areas access to clean and affordable energy, was one of the policy's major accomplishments. A variety of renewable energy projects, including small hydropower plants and solar systems, were also developed as a result of the strategy. Additionally, the strategy promoted foreign investment in the energy industry, which aided in the advancement of cutting-edge technology and infrastructure. Ultimately, Sierra Leone's National Energy Policy from 2009 led to some improvements in the energy sector (Jalloh, 2017).

However, implementing this policy remains inadequate. This is because of factors such as policymakers' insufficient expertise and comprehension, capacity and resource limitations, the ineffective integration of partners, and the limited institutional structures that impede policy enforcement. These issues have prevented the restructuring of the energy sector from happening and led to the ongoing reliance on unreliable and inefficient energy sources. More financing and resources are needed to promote energy sector changes, better management and information exchange among partners and enhanced institutional frameworks to ensure that essential regulations are in place. To effectively conduct energy sector restructuring and build and improve the institutional frameworks required for implementation, it is crucial to guarantee that resources and funds are forthcoming.

Also, the operation of the energy sector is disturbed by limited infrastructure. It is especially true in Sierra Leone, where several villages still lack electricity. Because of the restricted capacity to conserve, distribute, and transport energy to its destination, production costs are much higher than necessary and energy efficiency remains challenging. It hinders local businesses' capacity to compete globally and access the global market, thereby limiting economic growth and development. Moreover, limited

infrastructure investment has led to an unpredictable electrical supply and an inadequate transmission network, which can frequently cause power shortages, blackouts, and frequent power interruptions. These power outages can be particularly costly to companies that depend on electricity, like manufacturing and agriculture, as it hinders production and lowers the country's economic growth. Since it is crucial to guarantee a dependable and stable energy supply to promote economic progress, the absence of facilities has turned into a significant concern for Sierra Leone. The infrastructure and regulatory framework for the energy sector need to be strengthened by the government of Sierra Leone. These actions include increasing the funds allocated to the energy industry, putting in place strong laws that support renewable energy sources, and expanding infrastructure spending. The energy sector needs skilled and competent personnel to function effectively. The government should also prioritise educational programmes to enable staff members to acquire the skills required in the energy sector. The government should recruit and train suitable professionals from within the nation and offer scholarships and internships for energy-related disciplines at international colleges.

The absence of an independent energy body to administer all energy affairs of the country is another limitation of the Sierra Leone energy sector. This lack of regulation may result in monopolistic behaviour and a lack of transparency, raising electricity costs and limiting access to other energy sources. It discourages foreign investment in the energy sector and hinders technological advancements and renewable energy growth. It prevents the industry from being appropriately regulated and observed to ensure its sustainability and efficient use of resources. The exclusion of regulations harms the environment and endangers the health and safety of workers and communities. The government should create a separate organisation to oversee the energy industry and ensure its maximum capacity. To guarantee that decisions are in the country's interest, such an independent organisation should be answerable to the government and have a transparent management structure. Only when the energy sector has an independent body to control all the energy affairs will it be transparent, accountable and prevent several clashes of interests from the energy-related ministries.

The Sierra Leone Energy Sector is vulnerable to price fluctuations and supply disruptions due to its reliance on imported fossil fuels (Koroma & Rongcheng, 2009). This vulnerability may cause increased electricity prices and impede economic growth. It is among the leading limitations of the energy sector. For decades, huge funds have been spent on importing fuel for the power generators in the country. However, despite the huge funds spent yearly on fuel importation, the energy situation remains the same because these machines cannot supply uninterrupted power because of regular breakdowns and unskilled personnel, which increases expenditure for repairing and maintaining them. As long as the energy sector remains dependent on imported fuel, it would be challenging to improve the energy situation. Funds spent on importation will be used for development purposes.

Limited funding is another limitation of the energy sector. Limited funding often leads to limited investment in research and development, which can hinder the sector's ability to innovate and keep up with technological advancements. Additionally, it limits the sector's ability to expand and meet the growing energy demands. Funding research and development programs can help the innovation of new technologies that increase the power supply in the country. It can also improve the status of the sector's standard and create more job opportunities leading to economic growth.

Another limitation of the energy sector is upgrading the sector's system. The existing system in the energy sector is the same as what has been in place for decades. The Sierra Leone Energy Sector's limitation is modernising its infrastructure due to insufficient funding and outdated technology. It has resulted in inefficient energy production and distribution, hindering the sector's growth and ability to meet the increasing energy demand. Modernisation of the system is crucial for the energy sector to keep up with the changing technological landscape and increase efficiency. Failure to upgrade the sector's system can lead to outdated infrastructure, slow energy production and higher electricity costs.

Limited public awareness of responsible energy utilisation is another limitation of the Sierra Leone Energy Sector. The rural population especially has limited awareness about how to use energy responsibly. This limited awareness leads to excessive consumption and waste of energy, which in turn contributes to environmental

degradation and increased energy costs. It puts additional strain on the country's already limited energy resources. To address this issue, the government and private sector should collaborate to launch public awareness campaigns that educate citizens on the importance of responsible energy use. These campaigns could include information on energy-saving practices, renewable energy sources, and the impact of excessive energy consumption on the environment. Doing so will improve public awareness of energy use and reduce waste and illegal means of power connection.

Progress in the energy sector is needed to improve infrastructure and access to electricity. These barriers include limited funding, inadequate policy implementation, poor infrastructure, a shortage of skilled workers, a lack of an independent energy sector, and less public awareness of the significance of energy conservation. Governments must prioritise spending on education and training, more financing for energy-related projects, and raising public awareness of energy-saving initiatives to address these issues and build more effective energy infrastructure. To share information and resources, create innovative methods and creative solutions, and advance energy access, there also needs to be more cooperation between companies, governments, and civil society organisations. Through such cooperative initiatives, there is the possibility to reduce barriers to energy access, enhance facilities, and develop a more effective energy system.

Limitations of Sierra Leone's Electricity System

There is a severe lack of resources available to meet the nation's electricity demands, and this is what is preventing Sierra Leone from developing. Only 8.2% of households in Sierra Leone, according to the IEA (2020), have access to power, and most regions lack grid connections. As a result, people rely on conventional, expensive sources like kerosene, fuel, charcoal, and firewood. A lack of investment in the infrastructure for power has resulted in outages that can last up to several hours per day in big cities, and inconsistent supply is prevalent even in places with power systems. Due to these problems, household electricity expenditures are more than twice as high as the continent's average. The government must expand funds for energy infrastructure, encourage using renewable energy sources, and support initiatives that

give people better access to dependable and inexpensive electricity to eliminate energy poverty. The GoSL has several objectives that it aims to achieve. They include promoting economic growth, improving access to education and healthcare, promoting good governance and transparency, promoting peace and stability, and protecting the environment and natural resources. The aspiration of these objectives is to improve living standards and make a good impact on the larger international society through these varied goals. To achieve its objectives, the government must prioritise energy efficiency and access to clean energy. Problems with the electrical distribution and transmission networks lead to losses of about 45% of the produced electricity (Blimpo, 2019). The mining industry relies on internal captive generation to satisfy its high-power consumption, while those outside the industries frequently employ private generators. According to assessments from late 2013, Sierra Leone operated over 33,000 diesel generators with a total capacity of about 180 megawatts (Anderson & Beresford, 2016). The country's reliance on diesel generators is inefficient, expensive, and has environmental effects, in addition to raising expenses for companies and households (UNDP, 2017). Given Sierra Leone's abundant natural resources, there is a fantastic chance to use these resources and create modern energy technology that would not only cut down on electricity losses but also have positive economic effects (Kandeh et al, 2023). With this, the government can expand the nation's overburdened transmission and distribution networks and increase generation through several new thermal, hydro, and biomass projects.

It is unquestionably true that the commodities in the energy sector are in short supply, exceeding demand from the populace, localities, and the nation. It is due to the accessibility and availability of energy and electrical products. There are several difficulties that the electricity system must overcome because of the rising electricity demand. The citizens who want a dependable and secure supply face a significant problem because of the electricity demand's explosive development. The electricity system should discover ways to expand the power supply and improve electricity usage as demand remains high. The energy sector should investigate ways to improve the infrastructure of the current power system and introduce new technologies that can boost the effectiveness of electricity use to meet this problem.

This study supports the notion that several problems are associated with the electricity supply in Sierra Leone. Significant among them is that renewable energy sources used are limited due to a lack of accessibility. The energy produced is anticipated to come from renewable sources by 2030. Integrating renewable energy sources into the existing system is challenging due to weather conditions. Renewable energy sources are therefore defined from this perspective as unstable energy sources, and their operation without a sophisticated management system can result in a significant supply imbalance. Artificial intelligence can improve prediction systems by using capacitors or other power storage devices to store energy for later use. Using this strategy, utility companies may more effectively plan for their customers' electricity requirements, and energy management solutions can make renewable energy a trustworthy replacement for fossil energy.

The loss in electricity transmission is also affecting the operation of the energy sector of Sierra Leone. Long-distance electricity transmission raises the temperature inside power lines, leading to energy losses. Fees for energy transmission losses accounted for 5% of total electricity prices paid in the country by families and 4 % by private businesses in 2019 (SLCG, 2020). Even though the energy sector only loses about 5% of its energy, the distant areas are seeing significantly greater percentages. There is a remedy for energy modernisation. Even for domestic use, energy consumption is as close to its source as possible when there are several networks of local energy sources instead of a few power plants supplying all the electricity. In addition, the nation experiences frequent power disruptions. Extreme weather and outdated electricity cables are the two main reasons for outages. Although urban residents are not frequently affected, severe power outages pose a risk to many people in rural areas and have already caused significant damage across the country. Large-scale blackouts not only stop people from living in the affected areas, but they can also harm electronic equipment. Power outages can be less frequent in certain circumstances. Power outages increase energy independence on alternative energy sources, such as capacitors, which can provide lengthy resilience and guarantee the uninterrupted operation of critical equipment.

Funding for the electricity system is a major challenge for the Sierra Leone government. There are many issues regarding the funding and investment of the electricity system in Sierra Leone, including a lack of private investments, insufficient economic incentives, the need for PAYGO accessibility and assistance, the need for micro-loans for solar firms, and the absence of a fully functional digital payment system. The Sierra Leonean government must establish economic incentives for businesses to invest in the system. Guarantee PAYGO systems are accessible and affordable to individuals and encourage private investments in power by offering welfare benefits and other economic assistance. The government should also establish a fully working digital payment system to enable simple and safe transactions, and small loans for solar energy companies to enhance access to green energy. All these actions will aid in securing the financing and investment required for Sierra Leone to have a dependable and long-lasting electrical system.

Lack of concise legal framework is among the leading limitations of the Sierra Leone energy sector. Legislation is needed to regulate the private sector's involvement in electricity production, such as mini-grids, Power Purchase Agreements (PPAs), and solar imports. Additionally, there is a need for Rural Electrification Agencies, but none are currently available. The government must establish specialised rural electrification organisations funded, efficient, and furnished with cutting-edge technology to alleviate this resource shortage and guarantee that rural areas access dependable electricity. To provide residents with clean energy and efficient rural electrification organisations are necessary. Through supporting portable generators and PPAs and streamlining importation, the private sector should be motivated to partake in the production of electricity. The government must guarantee that rural areas have access to dependable electricity at a reasonable price through specialised organisations, financial aid, and legislation intended to promote the use of renewable energy sources. Whether people live in an urban or rural area, the main objective should be to ensure that everyone has access to safe and dependable electricity.

Insufficient electricity infrastructure is affecting the transmission and distribution of electricity in the various regions of the country. The transmission and distribution infrastructure need to be improved, as quite several of the country's

populations lack access to power. Several power distribution plants were destroyed during the civil war. The existing infrastructure is mature and has poor energy efficiency, significant power losses in the generation, transmission, and distribution sectors, and insufficient electricity production. The transmission and distribution infrastructure must be upgraded to ensure everyone has access to power. To supply dependable and efficient electricity, these improvements should involve building new power plants, extending the electricity network, and enhancing the current infrastructure. The long-term sustainability of the electrical supply is essential to guarantee that all residents have access to energy. Energy policy must ensure the energy infrastructure is maintained and operated. Lawmakers must ensure electricity prices remain reasonable, infrastructure is secure, and improvements are made. Governments and utility companies must collaborate to create a thorough plan for enhancing and modernising the electrical infrastructure to accomplish these aims.

It is challenging to get accurate data and reports of energy statistics in Sierra Leone because of inadequate data collection and reports. It is challenging to get accurate data on the energy sector in Sierra Leone. The reason is insufficient data gathering and insufficient in-depth investigation. The inability to collect accurate data is an obstacle in figuring out what the people of Sierra Leone require in terms of energy. Understanding the precise dynamics of energy supply and demand, as well as the available energy sources and infrastructure, has proven to be challenging due to this knowledge gap. Lawmakers use old or insufficient data resulting in ineffective energy sector policy decisions. Also, the understanding of how energy supply and demand are genuinely related to economic development, poverty alleviation, and environmental protection. It has affected the absence of thorough inquiry into the energy industry. The energy industry in Sierra Leone has suffered significantly because of the lack of trustworthy data collection. Therefore, it has hampered efforts to carry out energy projects and policies that would give more citizens access to contemporary energy sources. Access to reliable energy statistics has been difficult to attain in the country. As a result, it has been challenging for researchers and policymakers to determine the country’s exact energy demands, create effective policies, and make wise energy investment choices. Therefore, it has become challenging to track and assess already-running energy

projects and programmes, which has resulted in a general lack of accountability in the industry. Access to unreliable energy data has been a significant impediment to improving access.

Inadequate awareness of modern energy technologies for energy utilisation and conservation is another challenge of the country's energy sector activity. Not many citizens of the rural areas of Sierra Leone are aware of the quality standards for modern electrical products and the benefits of improved cooking types of equipment for environmental safety. Due to unawareness, more firewood and coal are used for cooking, which is not safe for the environment and people's health. Air pollution, deforestation, and other environmental problems have increased because of this. The rate of people using biomass to cook is alarming and this is a problem for the current and future generation of the country (Dumbuya, 2015). To solve this issue, there is a need for more education and awareness-building regarding solar energy equipment, culinary appliances, and the advantages of clean energy sources. Non-governmental organisations should be developed to educate rural Sierra Leoneans on solar energy and cooking equipment. These organisations should work with government and international bodies to promote using solar energy products and improved cooking equipment in rural areas. In addition, the government and NGOs should invest in public campaigns to raise awareness of the importance of protecting the environment and using renewable energy sources. Such campaigns could focus on the health benefits associated with clean energy sources and the economic and environmental benefits. By launching such initiatives, the government and non-governmental organisations can assist in educating rural populations about the value of renewable energy sources and improved cooking, resulting in a more effective, ecologically friendly approach to energy usage in Sierra Leone.

There is a huge gap between the demand and supply of power in the electricity system. The power grid strain caused blackouts across the country. In the electricity system, this disparity has led to several issues, including shortages, and high-power costs. Population growth, energy consumption, and limited resources are contributing to the electricity gap (Kandeh et al., 2023). The difference between supply and demand has led to an increase in the price of electricity for users. Electricity prices affect everyone,

from corporations to households. Government and suppliers must collaborate to improve electricity generation and distribution. The mechanisms for lowering consumer costs and ensuring that electricity is supplied consistently must be created. The Government and electricity operators can help close the supply-demand gap by incorporating renewable energy sources and reducing the cost of electricity generation and distribution. It will benefit the environment, lower carbon emissions, and contribute to the long-term development of a more sustainable energy system. The control of the supply and demand of electricity is by the Energy Management System (SLGCG, 2020). EMS monitors the energy supply and identifies changes to ensure electricity is used efficiently. The EMS uses a range of technologies to maximise power use. Some Sierra Leoneans, however, are not aware of this management system. The discrepancy between supply and demand is to blame for this. In Sierra Leone, the disparity between supply and demand for energy has always been a problem and is only getting worse as the population grows. The GoSL must expand the energy supply to close this gap and raise awareness of EMS.

There are limited modern energy technologies available in Sierra Leone for electricity transmission and distribution. Despite the introduction of the "prepaid metre" system, some people are still using the old metre. Prepaid metres are not used in many rural areas and some urban areas because people need dependable electricity connections, which are not always available. Furthermore, consumers might be unable to afford the upfront payments that prepaid metres could require. Some could not comprehend how the prepaid metre system operates. As a result, it is frequently challenging to implement prepaid metres in places with unreliable energy connections and where individuals might lack the resources or knowledge of the system. Prepaid metres are an effective form of electricity distribution, but they can be a barrier for individuals. Prepaid metre systems must be accessible to those who cannot afford them. Prepaid metres have the potential to revolutionise the way power is supplied in places with unreliable connections. However, the unsuccessful deployment necessitates overcoming the difficulty of explaining the system to consumers and offering reasonable upfront payments. People find ways to adjust the metre to lower their

consumption records. It is due to inadequate household metre monitoring. The power company must ensure regular monitoring of household metre consumption records.

Notwithstanding the various renewable energy sources like solar, wind and hydropower available in Sierra Leone, they remain under-utilised. As a result, insufficient energy substitution with renewable energy is another challenge preventing the energy sector from increasing electricity supply. Some countries in the world combine the use of energy with renewable energy to meet consumer demand. It is different in the case of Sierra Leone, where most renewable energy remains under-utilised. Despite having access to several of them, the nation cannot integrate renewable energy sources into its energy infrastructure. This is a result of the inability to obtain the technology, resources, and information needed for incorporating renewable energy. As a result, the country continues to be reliant on costly, unreliable, and hazardous energy sources. The country can overcome these barriers and maximise the use of renewable energy resources, but it needs to develop a comprehensive framework for incorporating renewable energy. This strategy should include infrastructure expenditures, technological advancements, and rules that guarantee the efficient use of renewable energy sources.

In the Sierra Leonean energy sector, poor-quality electricity capacity has always been a problem. A substantial segment of the population has been without access to reasonably priced and reliable energy because of the nation's long-standing reliance on imports for its electricity needs (UNDP REPORT, 2018). The majority of Sierra Leoneans live without access to dependable power due to infrastructure mismanagement that has significantly hampered the country's ability to produce electricity. Because of the high cost of electricity due to this inadequate infrastructure, it is much more difficult for people to acquire the power they require. The government must build and upgrade infrastructure to provide reliable and reasonable power. The government should collaborate with various domestic and foreign organisations to improve and construct new power plants to achieve this goal. These organisations would support training programmes for local engineers, technicians, and operators to guarantee that Sierra Leone's infrastructure is efficiently managed and maintained, in addition to providing the technical know-how and resources required to construct and modernised the power

plants. These organisations should collaborate with the government to ensure that there are adequate policies and regulations in place to protect people from excessive electricity prices, as well as to ensure that energy providers have incentives to invest in developing a dependable energy infrastructure. These organisations with the help of the government will also provide the necessary resources. These initiatives will allow the government of Sierra Leone to make considerable strides in supplying its people with safe and affordable electricity.

Impact of Electricity Outages on Sustainable Development in Sierra Leone

The availability of electricity is essential for achieving economic improvement and human development because development is closely related to energy access (Dumbuya, 2015). Sustainable development objectives include eradicating poverty, improve education, promoting gender equality, improving health, and preventing infectious illnesses, which depend on energy. Many African states are encountering difficulties in energy access, particularly clean and economic power. Many of these nations struggle to meet basic requirements like food, water, healthcare, and education without access to energy (IEA, 2020). Therefore, African governments must increase access to clean, affordable energy to combat poverty and hunger and advance gender equality. These African nations must try to guarantee that their citizens have access to inexpensive, clean energy. Such energy accessibility can boost economic growth, advance gender equality, and enhance living standards. As a result, governments, non-governmental organisations, and the global community fund and support programmes that promote access to clean and affordable energy. Sierra Leone can significantly impact the fight against poverty and hunger by offering clean and reasonable electricity. Energy access contributes to improved health and educational outcomes, economic growth and environmental sustainability, and reduced poverty and hunger. Likewise, having access to electricity can strengthen communities and empower women by giving them more chances to generate revenue and enjoy better living conditions. In the nation, especially, having access to affordable, clean energy can make a significant difference (Patel, 2017). By supplying power for dehydrating crops, lighting institutions and clinics, lighting industries, and pumping water for irrigation, access to energy boosts

earnings and improves health in rural communities. As a result, rural communities have greater access to education, healthier diets, and better healthcare. Energy access also offers a reliable and affordable mode of transportation, which promotes communication and the interchange of goods and services. It is crucial to acknowledge the significance of energy access for rural areas and its potential to raise residents' quality of life considering these benefits. Therefore, having access to energy will not only contributes to the infrastructure of a rural community but also serves as a potent means of reducing poverty and fostering social and economic advancement. The way one produces and consumes energy is not sustainable for the economy, environment, or society. The globe needs to move away from older, more conventional energy sources like fossil fuels and biomass to attain sustainability (IEA, 2020). To be sustainable, one must seriously consider our obligation to fight climate change and safeguard the environment. Sustainability requires us to consider how one's choices now may affect future generations to prevent leaving behind an uninhabitable world. Consider the effects of one's actions on future generations leaving behind an unsustainable world. By taking responsibility for one's actions and considering the impacts of our choices, one can promote sustainability and protect the planet's resources. As a result, this entails living in harmony with the environment by using fewer resources and protecting natural resources.

Before the post-independence era in Sierra Leone, the GoSL aimed to develop a sustaining nation that could be free from dependency on colonial masters. The governments have made several efforts to achieve this goal. They include developing a more diverse economy with a stronger emphasis on the energy sector and Agric-industries and enhancing the nation's infrastructure. Despite these initiatives, Sierra Leone is among the poorest countries in the world, with wide gaps in access to essential services like electricity, healthcare facilities, and education. Additionally, a sizable section of the population lives in rural areas without access to basic amenities like electricity or communication. The country's economy is still unstable and heavily dependent on outside assistance. Over a decade, Sierra Leone has launched several measures to raise living standards. These programmes include creating laws that support economic expansion, expanding access to education and healthcare, and funding

infrastructural improvements that will make it easier to obtain essential services. The situation remains stable, particularly in the energy area, because most people still cook and heat their homes with firewood, contributing to deforestation and increased air pollution. The nation still lacks access to clean energy. With a focus on developing renewable energy sources, Sierra Leone must commit to building a sustainable energy system to address these issues. However, this ambition remains unaccomplished, since the nation has the challenge of providing efficient electricity, a key element of sustainable development. The country should set an ambitious goal of providing all citizens with access to power by 2030 to meet the global energy requirements. Renewable energy sources are essential to reduce Sierra Leone's reliance on imported fuels. The government must provide incentives to encourage private investment in renewable energy projects. The government should focus on developing expertise in renewable energy policy, legislation, and technology. This initiative must ensure effective policy and regulation execution while fostering an environment conducive to renewable energy investments. A clear regulatory framework must be created, current impediments removed, and local partners included. The government must provide targeted technical assistance and support to local representatives, create a policy and regulatory framework, and fortify current legal frameworks.

The importance of energy was prioritized at the 2002 World Summit on Sustainable Development. Governments, non-governmental groups, and even private owners realize it is essential to sustainable development. Participants in the summit convened to discuss the energy crisis and reach a consensus on a strategy for sustainable development. The International Renewable Energy Agency (IRENA) was established at the summit to assist nations with implementing renewable energy policy and initiatives and to support the advancement of sustainable development. The constraints to sustainable development vary, but electricity shortages are a far obstacle to development. An electricity shortage is a pressing energy problem that most developing nations are experiencing, and most of these nations lack access to an efficient power supply. Sub-Saharan Africa lacks access to reliable electricity, hampering these nations' progress, with Sierra Leone among them (David & Sokona, 2001; IEA, 2002; Saka, 2015; UNDP, 2018; Wamukonya, 2001). One of the causes of Sierra Leone's slow

development is the power shortage, which impedes economic expansion and lowers living standards. Sierra Leone's inhabitants must have access to sufficient electricity infrastructure and a dependable power supply to alleviate the country's energy crisis and promote sustainable development. In Sierra Leone, an enormous number of the populace cannot access electricity for household cooking, the operation of public institutions, industrial production, or business management.

The inability of the energy sector to provide electricity contributes to social instability, which harms sustainable development. Therefore, the lack of reliable energy negatively impacts the economy, public safety, school system, and health care. Lack of electricity affects the medical field, preventing doctors from using life-saving equipment. Electricity is essential for transporting medical supplies and storing pharmaceuticals. Additionally, the lack of power prevents a sizable section of the population from accessing healthcare services, increases the incidence of preventable illnesses and exacerbates already-existing public health problems. The lack of reliable electricity has a significant and far-reaching impact on the healthcare system, affecting the availability of vital services like transportation and medical equipment. Without reliable and consistent access to electricity, individuals, households, businesses, and communities struggle to achieve sustainable development. A power supply is also essential for the industrial, agricultural, and mining sectors. Electricity is essential for rural localities to produce and store farm yields. The capability to afford electricity depends on the income raised from farming. Therefore, access to energy is required to boost the agricultural sector's revenue and develop a workable long-term strategy for farmers. With such access, agricultural activities can be done effectively and affordably, facilitating economic growth. Dependable energy will provide rural farmers access to innovative equipment and irrigation systems, reducing the cost of agricultural operations. Meanwhile, in the mining area, all activities require electricity. In Sierra Leone, the mining industry is a significant element in population development. In the industrial sector, every component needs the power to function. The mining and industrial sectors of Sierra Leone will be unproductive without energy. The mining industry cannot significantly contribute to economic growth and development without a consistent and sustainable electrical supply. Therefore, supplying the mining and

industrial sectors with dependable and sustainable power is essential for Sierra Leone to experience economic growth and development. For the mining industry to sustainably contribute to development in Sierra Leone, the government must invest in solid power infrastructure. Educational institutions require a stable power supply for their standard administration. Education is essential for a nation's prosperity, providing a reliable energy source. As a result, for educational institutions to function correctly and promote national growth, a consistent power supply is a requirement. Educational institutions should stay up to date with technological developments to provide informed students with the skills and knowledge they need to contribute.

The private sector is likewise crucial to the development of a nation. The private sector invests in infrastructure, technology, and other sectors to create jobs. The involvement of the private sector in the energy area can help improve the energy situation by increasing household connectivity, expanding businesses, and improving healthcare facilities, education, agricultural activities, and livelihood. However, private investors prefer to invest in states with efficient power supplies. Therefore, an electricity shortage would make it challenging to attract more private investment to invest in the country. Private investments increase sustainable development by creating new projects and jobs. As a result, private investments can be a more productive and improve the economy, which can then improve resource allocation and economic growth. Private investments stimulate economic development by introducing new technologies, boosting productivity, and creating capital markets. Access to electricity is a major barrier to population growth. The absence of electricity impacts the nation's overall growth and denies its residents access to contemporary conveniences and services. Lack of energy access has hindered progress in healthcare, education, and economic development. Because of this, despite Sierra Leone's capacity to lead the economic and social growth of West Africa, its lack of electricity prevents it from realising these potentials. The Sierra Leonean administration must strengthen the energy infrastructure and access to electricity. To do this, the government must develop a long-term strategy to improve energy. Enhance energy infrastructure, increase access to electricity, and support clean and renewable energy sources. Access to energy is essential for sustainable development in developing countries. This is because most of the

developmental initiatives are related to energy. For Sierra Leone to promote its ambition to become a developed and self-sustaining nation, it must first address these electricity distribution problems. Only then will the country increase its aim of sustainable development.

Consequences of Electricity Shortages in Sierra Leone

Political apathy to Sierra Leone's electrical delivery has adverse consequences on electricity access in the country (SLCG, 2020). For decades, Sierra Leone has struggled with a lack of dependable electrical supply, and sadly, the government's reaction to this problem has been, at best, mediocre. Given the fact that having access to electricity is essential for enhancing living standards shown and fostering economic growth, government leaders in Sierra Leone have shown little enthusiasm for making the necessary infrastructure improvements fairly. Due to this disregard, there are often blackouts and there is restricted access to electricity, especially in rural areas. It is obvious that both the public and commercial sectors must work together to address this problem, but until political leaders demonstrate a stronger sense of urgency, it is unlikely that much progress will be accomplished. The effects of political indifference to this pressing issue are still being felt by Sierra Leoneans. The current administration frequently prioritises the development of energy in the nation's strongholds. For instance, the All People's Congress government, in office from 2009 to 2017, built more electricity infrastructure in the Northern part of the nation than in any other. As a result, there were frequent power outages in different regions of the nation (Sierra Loaded, 2022).

These variations in racial heritage and access to electricity are not particular to Sierra Leone. Significant differences exist in the availability and delivery of energy around the nation's borders (Hysa et al., 2023). The political and economic power dynamics that benefit certain regions or groups over others are frequently reflected in these discrepancies. These inequities are sometimes made worse by energy industry corruption and poor management. This prevents the rural regions from accessing dependable power, which hinders economic development and makes poverty worse. The healthcare, education, and communication sectors are all negatively impacted by

the shortage of electricity. Without electricity, towns refrained from the outside world, hospitals strain to offer proper treatment, and students are unable to study after dark. The government must give rural electrification first priority and collaborate with the private sector to create long-term solutions. The accomplishment of these initiatives is going to rely on the political will and dedication to bettering the lives of all Sierra Leoneans. Then and only then can we expect for a better future for our lovely nation and its citizens. Overall, the government must prioritise providing all residents, regardless of their geography or background, with equitable access to power. This will need large investments in infrastructure and legislative changes that support accountability and openness in the energy sector. To guarantee that resources are distributed equitably and effectively, it will also be necessary for governments, civil society organisations, and foreign partners to work together more closely. In the end, ensuring that everyone has access to power is not just an issue of social justice but also a crucial step towards sustainable development and the eradication of poverty across the continent.

Corruption has always been a problem in the energy sector in Sierra Leone. Several things can be considered as proof of this corruption. For instance, there are several reports of authorities accepting bribes in exchange for giving contracts to particular businesses (SLCG, 2020). Additionally, there have been incidents of misappropriation or embezzlement of monies designated for energy projects. Due to this, significant projects that would have enhanced the nation's energy infrastructure have been postponed or even cancelled. The energy industry also lacks openness, with many decisions being made behind curtains without sufficient transparency or input. Because of this, there is a lack of confidence among the financiers and the general public, which makes it challenging to secure the capital required to upgrade the system. In general, it is evident that corruption is a significant problem in the energy system of Sierra Leone and that immediate action must be made to solve it if the nation is to accomplish its development objectives.

The people of Sierra Leone are facing constraints because of electricity shortages. When electricity is unavailable, people must re-evaluate their entire schedule and plan on how to carry on without the ability to use power. There is a collapse of routine that happens when there is no electricity. People might not realise how many

things in a person's home depend on electricity to work, but living without it is more challenging than some people imagine. People rely on electrically controlled devices for many things, including heat, food, water, entertainment, and communication. People can power the technology they use everyday thanks to electricity. People won't be able to use the bathroom, store food in their refrigerator or freezer, or have safe drinking water if they attempt to survive without electricity. Although humans have existed without it for millennia, humans have developed a dependence on it and centred lives around it. Humans depend so heavily on electricity that losing a reliable supply would be challenging for people. Other people do not have any access to energy at all. According to Koroma & Rongcheng (2009), there are still Sierra Leoneans without access to electricity. Only 26.2% of the population of Sierra Leone have access to electricity (World Bank Global Electrification Database, 2020). Although progress towards connecting some remote areas to electricity has increased, there are challenges. Renewable energy sources and off-grid options, including solar electricity, will be crucial to reducing the number of people who live in the dark. Numerous families will lose power due to natural catastrophes, harsh weather, or power line malfunctions. A single power line damaged by a minor storm can result in a power outage that affects several families and residences, completely upsetting their daily schedules. Some individuals sometimes need convincing before they understand that losing electricity affects more than simply the internet; it also means losing access to cash registers, elevators, factory power, and gas pumps.

Limited electricity supply in any nation has adverse consequences. Electricity supply plays a significant role in a country’s development; therefore, its unavailability not only creates inconvenience for people but also has consequences for the population. Because of the regular power outages, imbalance supply, and high tariff, the nation of Sierra Leone is experiencing several consequences according to this study. They include:

A. Substandard education. There has been a decline in academic performance over the years in Sierra Leone. Because student homes, classrooms, laboratories, and libraries lack electricity, students must rely on other electricity alternatives (candles, battery

lights, or kerosene lamps) for lighting. As a result, students' performances are below average because they lack the comfort to enjoy studying with the convenience of electricity.

B. Inadequate health care operations. Given that there is a huge need for electricity availability in healthcare facilities, the lack of an efficient and constant power supply has a negative impact on the healthcare system. Every second of a hospital blackout puts lives at risk. Recently, according to a report (SierraLoaded, 2022), several health posts across Sierra Leone are calling for an improvement in the poor conditions of their facilities, with an electricity shortage being one of the core reasons.

C. Inadequate income. Without electricity, there is not much an average person can contribute to the economy. Other energy countries in Africa generate huge resources from electricity yearly. The income generated from electricity is used to improve their energy system and other developments. When people do not have enough power to generate income, their spending and demand fall. As a result, the nation will not have a system in place for sustainable growth and poverty eradication.

D. Damaging household electric appliances. People's electric appliances are being destroyed by a shortage of power or a poor connection.

E. Decrease in agricultural productivity. One of the major setbacks of Sierra Leone’s economy is a poor agricultural system. Sierra Leone is blessed with a good ecosystem for farming. However, there is low farming produce and citizens are still dependent on imported produce for feeding. The rate of hunger is still high in the country despite the country’s potential to feed everyone. Else from feeding, the produce from agriculture increases living standards and supports economic growth. A productive framing requires an uninterrupted power supply.

F. The rate of industrialization is slowing. Because the effectiveness of industries depends on an uninterrupted electricity supply, a power outage reduces productivity and

slows the process. This is a major consequence of electricity outages because the productivity of these industries helps promote the development of the country.

G. The country's security is at risk. The crime rate in the country is rapidly growing. This is due to the frequent blackouts in various communities. Every second without lights puts people's lives in danger. This is a threat to the country's security, and it is because of the consequences of electricity shortages.

H. Limited private sector investment in the country. This is a major consequence of electricity shortages because the private sector has a significant role in the development of the country. Investors can only invest in an environment with constant power supply to run their companies. The presence of private investments creates jobs and supports economic growth. Therefore, less investment of private companies in the country hinders the nation's growth.

I. The decline in the standard of living. With regards to all the other aspects of improving living standards, electricity availability is among the main items. The condition of current Sierra Leonean society is filled with more destitute citizens because several people cannot enjoy the benefits of reliable and affordable power supplies.

J. Theft of electricity and this causes loss of the electricity company.

The effects of Sierra Leone's electrical crisis are extensive. It's seriously impeding progress and economic growth. Businesses struggle to function effectively without a consistent supply of electricity, which results in lower productivity and fewer job possibilities. Healthcare services are also significantly impacted by the electricity shortages. Electricity is required to run medical equipment and deliver basic services in hospitals and clinics. Without a reliable power source, patient care is jeopardised, and healthcare providers struggle to provide necessary care. The effectiveness of the nation's educational system is also significantly influenced by education. Schools find it challenging to give children a comfortable learning environment without electricity. The

use of technology in classrooms is hampered by a lack of electricity, which makes it challenging for pupils to access educational materials and impedes their overall academic progress. Additionally, electricity outages interfere with schools' capacity to run smoothly, causing schedule disruptions and a limited extracurricular activity that are important to a comprehensive education. Ultimately, the shortage of power in hospitals and schools not only interferes with the operations of the country's major industries but also retards social and economic development. To guarantee a better future for youth, it is essential for the government and related stakeholders to prioritise supplying dependable electricity to all sectors of the nation.

CHAPTER V
Conclusion

In the introduction section of this research, the concept of energy justice is discussed. The concept of energy justice seeks to address the challenges of energy access and distribution with an emphasis on the marginalised groups who are ignored in energy distribution. This study explored the underlying causes of electricity shortages in Sierra Leone, the factors affecting an efficient electricity supply and the impact of limited power supply on sustainable development by examining the activities of the country's energy sector, the electricity system, demand and supply, tariff management, and the effectiveness of energy policy followed by the impact and consequences of electricity shortages. The thesis introduced the study by discussing the background, statement of the problem, the purpose of the study, research questions, and significance of the study furthered by the methodology used for the research, limitations, definition of terms, and the thesis structure. A thorough literature review on the energy situation, energy sector, energy efficiency, the demand and supply of electricity, followed by renewable energy, energy policy, electricity and sustainable development and finally the previous related research on Sierra Leone energy distribution is conducted in Chapter II. This chapter examined the situations of energy in sub-Saharan African countries, the activities of various African energy sectors, the gap between the demand and supply of energy, furthered by the availability and utilisation of various renewable energies, as well as energy policy and the structural framework. The assessment of the relationship between electricity supply and sustainable development and, finally, previous related research is discussed in this chapter. Further, Chapter III aimed to answer the main research question and sub-questions that emerged from this research accordingly. The main research question of this study is: What are the contributing factors that result in an unequal distribution of electricity in Sierra Leone? This study reveals that the challenges of implementing the energy policy, mismanagement of the energy sector and a low installed power capacity for electricity supply are the main causes of frequent blackouts in Sierra Leone. The first sub-question of this study is: what are the factors affecting power supply in Sierra Leone? The findings of this study

indicate that insufficient funding of the electricity system, limited availability of modern energy technology and insufficient energy infrastructures for transmission and distribution of power are the factors affecting an efficient power supply in Sierra Leone. Lastly, how does electricity outages impact sustainable development is the final sub-question of this study. This study found that the objectives of sustainable development which are, eradicating poverty, improving education, promoting gender equality and improving healthcare systems depend on unlimited electricity supply. As a result of the limited power supply in Sierra Leone, electricity outages have an adverse impact on the objectives of sustainable development. Meanwhile, in Chapter IV, an in-depth discussion is done on the limitations of the energy sector and electricity supply system followed by the consequences of electricity shortages. In general, the main limitations of Sierra Leone's energy sectors include limited energy infrastructures, limited funding of the energy sector and limited trained and qualified energy personnel are the major limitations of the Sierra Leone energy sector. As a result of unfair electricity distribution in Sierra Leone, there are consequences of limited power supply. They include substandard education, inadequate healthcare facilities and decline of living standards. In Chapter V, the conclusion section of this thesis summarises the findings of the research, adds the limitations, and makes recommendations.

It has been overdue for Sierra Leone to have electrical issues, and urgent system changes are required. The infrastructure cannot keep up with demand due to the population expansion that is occurring so quickly. As a result, outages are becoming more frequent, leaving individuals and corporations without electricity. Several people are having their lives disrupted by these power outages, particularly in rural areas where access to electricity is much more limited. Even worse, due to the unstable power supply, there has been a decline in economic output and access to necessities like healthcare, education, and other luxuries. People in these areas suffer because they cannot access resources, seriously affecting their living standards. The high cost of power in some regions of the nation, which makes it impossible for people to purchase essential utilities, further exacerbates these problems. As a result, companies in these remote locations find it difficult to function, and residents cannot air condition or heat their houses, placing pressure on the local industries. Rural populations are the ones

most impacted by these power disruptions. The electricity system urgently needs improvements. People in these rural towns have experienced financial difficulty. As a result, the situation will get much worse if nothing is done quickly.

Energy justice is concerned with the fair distribution of power resources to guarantee that everyone has access to safe and reasonable energy. Energy justice policy advocates for just and equitable solutions, addressing the discrepancies between those who have access to power and those who do not and dealing with the underlying causes of energy poverty. Sierra Leone has the potential to be a leading energy generator. But the energy sector is facing several challenges in administering its responsibilities. It is difficult to keep up with these changes as renewable energy sources expand, energy conservation demands rise, and new technologies change how electricity is generated and supplied. The energy sector faces a daunting task, including meeting the demand of a population constantly expanding and finding alternative energy sources and combating environmental degradation. The energy sector must make informed decisions to ensure sustainability. The energy sector must prioritise long-term sustainability and create plans to capitalise on evolving consumer demands and technological trends to handle these concerns.

Energy poverty impacts the country negatively. Distributive injustice leads to energy poverty, creating fire, health, and environmental risks, a form of energy injustice. As the absence of access to electricity affects disadvantaged people, energy poverty is an issue. Electricity poverty significantly influences social well-being and security in addition to the physical concerns brought on by limited access to energy. The fewer privileged households are unlikely to be able to afford the cost of electricity access, which further exacerbates poverty and inequality. People in energy poverty cannot take advantage of similar opportunities as other members of society without access to dependable power sources. High energy poverty causes socioeconomic and geographic inequality. When resources are distributed unevenly due to geographical disparities and constraints, it is crucial for the authority to determine where to apportion the energy resources. This redistribution could lessen energy poverty in a society where everyone has access to energy regardless of geography or socioeconomic background. Because people who live in specific places are treated unfairly in their access to

necessary energy services, regional inequalities in energy vulnerability are an evident illustration of energy injustice. Although all forms of energy poverty could be described as energy injustice, this unfairness is most evident when electricity is geographically distributed. The government has not prioritised energy poverty in the country. These underlying problems create risk throughout the country, especially in the rural area population that is marginalised in electricity distribution.

Marginalisation, exclusion, and a lack of access to energy resources because of economic hardship, socio-cultural prejudice, or structural obstacles exacerbate energy injustice. The risk of energy poverty affects low-income households and several marginalised populations, such as women and children. The inability of these households to get essential services like water and sanitation and infrastructural deficiencies make it challenging for them to find affordable electricity services, further increasing their vulnerability. For instance, people in rural and distant places are frequently poorer than people in cities and have less access to dependable energy sources. Because they use harmful and inefficient hydrocarbons for heating, cooking, and lighting, these energy-poor households are not just experiencing economic difficulties. They are also exposed to several health risks and environmental issues, such as air pollution and harmful gases.

This study aimed to understand the contributing factors that result in an unequal distribution of power in Sierra Leone, the factors affecting electricity supply and the impact of electricity outages on sustainable development. The findings reveal that ineffective energy policy implementation; mismanagement of the power supply system and low installed power capacity are the root causes of the electricity shortage. Further findings show that insufficient funding, limited modern energy technology and insufficient energy infrastructures are the key factors affecting electricity supply. Following this, electricity shortage is a significant obstacle to promoting sustainable development in Sierra Leone.

Also, previous studies have emphasised electricity transmission, distribution, and economic aspects, which are limited to the energy situation in Sierra Leone. Therefore, with an in-depth understanding of the electricity area, this study added to fill the gap in the unfair distribution of electricity, wherein the results indicate the factors

and impacts of an electricity shortage. Energy practitioners in Sierra Leone should highly consider the recommendations made by this study to improve the electricity situation. Paramount among the recommendations made by this study is the effective implementation of energy policy, improvement of the energy sector, improvement of modern energy technologies, adequate tariff management, and substitutions of renewable energy. Concerning the contribution this study makes to knowledge, there are only a limited number of people aware of the energy situation in Sierra Leone. Because of this, this study revealed the unfair distribution of electricity in Sierra Leone. However, there are some limitations associated with the research, and foremost among them is that this is the first thesis written by the researcher. Data was also gathered from secondary sources because the researcher was unable to use participants, questionnaires or do formal interviews due to the case study environment's limited electricity supply and technology. As a result, this study employs future research that will be conducted using primary sources and should involve participants through structured interviews in the case study setting.

Recommendations

The Way Forward

Having got an understanding of the factors contributing to unequal power supply in Sierra Leone, factors affecting power supply followed by the impact of electricity shortage on sustainable development, this study is proposing ways to improve the electricity issue in Sierra Leone.

Energy Policy and Regulation Framework

It is essential to mention that for the framework to be successfully operational, energy policy and regulation remain to be changed. To improve the information and the implementation of these regulations, it is initially necessary to clearly define the roles and duties of ministries and other pertinent authorities. Now, there is no independent organisation charged with promoting rural electricity in the country. The Ministry of Energy's numerous divisions, including SLEWRC, and EDSA, are in charge. Secondly, the rules regarding permissions for small network development and operation are

unclear. It is unclear which organisations oversee issuing these permissions, what the application procedures are, or whether they differ depending on the type or size of the grid. Also, the government's long-term electrification strategy is not quite apparent. Although some funds are available for private corporations for small networks, it is unclear how this integrates into the administration's electrification ambitions. Also, small networks will require funds to hasten growth and lessen the dangers connected with development in remote areas. Mini grids participating in development programmes led by international organisations are the only ones that can now get funding in the form of partitioned projects. Uncertain timing surrounds the creation of a Rural Electrification Fund, which would provide funding for both on- and off-grid rural electrification initiatives. Finally, although the government must establish guidelines for expense rates for small networks, there is no evidence of the consumers' desire or capacity to pay. Different consumer evaluations are still required.

Energy Policy Implementation

- The GoSL to enhance the energy sector’s policy and regulation on power supply.
- Implementation of an effective energy policy. This is to be done through an annual review of the energy policy and regulation to assess the effectiveness of the energy policy.
- Develop policy and strategic planning that is inclusive for all energy-related sectors.
- Inclusion of local stakeholders in power supplying affairs.
- Adopt policy methods for assuring the use of reliable technical equipment for Transmission and Distribution (T/D) of electricity.
- Adoption of rural electrification policy.
- Adoption of a policy of the standard utilisation and responsible use of renewable energy.
- The Government of Sierra Leone (GoSL) to strengthen the energy sector to improve the economic condition for sustainable development.
- GoSL to improve human capital development such that all citizens can afford power costs.

- GoSL to make strategic planning to minimise the negative effects of biomass use on communities.
- Develop dynamic short-term goals to improve power supply.
- Develop an independent institutional legal framework to regulate the electricity area.
- Enhancement of the energy sector's regulation and comprehensive manage the major concerns which should determine how dynamic energy policy will be implemented.
- Public awareness and responsibility. People should be taught the responsibility to conserve power. They should be taught their civil responsibility of consuming and conserving power responsibly.

Energy Infrastructure

- Building of standard technical capacity structures in all regions of the country.
- Annual supervision of various technical capacity structures to access if the improvement is required.
- Completion of the Bumbuna hydro phase two project and development of sub-sectors to act as hydro preservation.
- Improvement of the transmission and distribution of electricity.
- Improvement of modern technical types of equipment for transmission and distribution of power.
- Workshops and training of technical personnel.
- Development of an effective database system to collect and report electricity statistics annually.

Tariff Management

- Adopt a standard tariff management system.
- Introduce a system of regulating retail tariff.
- Develop a database system for the existing tariff system to monitor the landscape of tariff management.

- The energy sector to clearly state the proportion of subsidies needed to achieve a particular tariff such that both government and private sector would have an understanding on the cost of electrification.
- The cost of electricity accounts for a substantial percentage of Sierra Leone's GDP and a significant proportion of electricity consumption is from residences and the business sector. Developing standard tariff techniques will contribute to economic growth.
- Implement an independent tariff management framework.

Electricity Generation

- To ensure the nation’s non-renewable sources of energy are explored and utilised responsibly.
- Lowering the cost of generating commodities that are related to electricity supply.
- Improvement of power generation equipment and technologies.
- Creation of new power-generating facilities.
- Creation of power generation sub-sectors across the country.
- Frequent supervision of power generation facilities.

Demand and Supply of Electricity

- Improvement of supply rate.
- Annual demand and supply survey.
- Develop an independent demand and supply strategy.
- Implement a supply strategy that will match with the demand for electricity.
- Develop a suitable demand strategy that will attract private investments.
- The energy sector to expand and modify power sources to improve supply stability.

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Appendices

Appendix A

Turnitin Similarity Report

Michael Joseph LAMIN-ENERGY JUSTICE: THE UNFAIR ELECTRICITY DISTRIBUTION IN SIERRA LEONE

ORIGINALITY REPORT

5%	2%	3%	1%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	"Energy and Environmental Security in Developing Countries", Springer Science and Business Media LLC, 2021 Publication	1%
2	www.ncbi.nlm.nih.gov Internet Source	<1%
3	docs.neu.edu.tr Internet Source	<1%
4	Kirsten Jenkins, Darren McCauley, Raphael Heffron, Hannes Stephan, Robert Rehner. "Energy justice: A conceptual review", Energy Research & Social Science, 2016 Publication	<1%
5	S.A. Hirmer, H. George-Williams, J. Rhys, D. McNicholl, M. McCulloch. "Stakeholder decision-making: Understanding Sierra Leone's energy sector", Renewable and Sustainable Energy Reviews, 2021 Publication	<1%

Appendix B

Ethics Committee Approval

NEAR EAST UNIVERSITY

SCIENTIFIC RESEARCH ETHICS COMMITTEE

24.07.2023

Dear Michael Joseph Lamin

Your project **"Energy Justice: The Unfair Electricity Distribution In Sierra Leone"** has been evaluated. Since only secondary data will be used the project does not need to go through the ethics committee. You can start your research on the condition that you will use only secondary data.

Prof. Dr. Aşkın KİRAZ

The Coordinator of the Scientific Research Ethics Committee