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AN ASSESSMENT OF THE LEGAL AND REGULATORY FRAMEWORKS FOR BATTERY ENERGY STORAGE SYSTEMS IN ZAMBIA AND THEIR READINESS FOR CHANGING POWER SYSTEM REQUIREMENTS

By:

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2025

DECLARATION

I, **DAVID CHIFUNDO PHIRI**, do hereby declare that this dissertation entitled, '**AN ASSESSMENT OF THE LEGAL AND REGULATORY FRAMEWORKS FOR BATTERY ENERGY STORAGE SYSTEMS IN ZAMBIA AND THEIR READINESS FOR CHANGING POWER SYSTEM REQUIREMENTS'** which is hereby submitted in partial fulfilment of the requirement for the award of a Bachelor's Degree at the University of Lusaka is solely of my own and that it has, to the best of my knowledge, not yet been presented for any academic purposes in Zambia or elsewhere.

I hereby declare that I have read and understood the regulations governing the submission of the Bachelor of Laws Degree (LLB) dissertation including those relating to length and plagiarism, as contained in the rules of the University and that this dissertation conforms to those regulations.

....

DAVID CHIFUNDO PHIRI

2025

RECOMMENDATION

I, **CHILESHE KATONGO**, do recommend that the dissertation titled '**AN ASSESSMENT OF THE LEGAL AND REGULATORY FRAMEWORKS FOR BATTERY ENERGY STORAGE SYSTEMS IN ZAMBIA AND THEIR READINESS FOR CHANGING POWER SYSTEM REQUIREMENTS'**, done under my supervision, be admitted by the University for examination. I have checked it carefully and I am satisfied that it meets the requirements related to format as laid down by the University Regulations governing directed research.

....

Chileshe Katongo

2025

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Reverence to the Almighty God for the gift of life and opportunity to have undertaken this assignment.

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DEDICATION

I dedicate this dissertation to my wife Dabwitso Chapema Phiri and the boys David Chifundo Phiri III, Declan Chisomo Phiri and Dzon Chapema Phiri.

Further dedications go to my wider family and close friends for without whom the award of the LLB becomes void and of no purpose.

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KEY ACRONYMS AND ABBREVIATIONS

Abbreviation	Full Meaning
BESS	Battery Energy Storage System
EMA	Environmental Management Act
ERB	Energy Regulation Board
IEA	International Energy Agency
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IRP	Integrated Resource Plan
NFPA	National Fire Protection Association
NERC	North American Electric Reliability Corporation
PUCT	Public Utility Commission of Texas
SAPP	Southern African Power Pool
ZAGC	Zambia Grid Code
ZEMA	Zambia Environmental Management Agency

CHAPTER 1

INTRODUCTION

1.1. Introduction

Energy deficiency is becoming a global challenge.[1] This challenge has arisen as a result of many factors and these primarily border on the rapid growth in the global population. Increased population has come with modernisation and industrialisation leading to over exploitation of fossil energy resources and adverse alteration of the environment. To mitigate this challenge, there is a general trend to transition from legacy energy generation sources to renewable energy technologies.[2] The transition has also been spurred by behavioural changes in consumers, decision makers, entrepreneurs, and governments.[3]

Unlike the traditional energy resources such as coal, oil and natural gas, renewable energy resources cannot be stored. The ability to generate power from renewable energy resources is dependent on weather patterns and natural events whose characteristics change repeatedly.[4] Storage systems are thus required to store the power as it is generated and to be used at a later stage.[5] There are various energy storage technologies in use and these respond to different engineering principles namely; mechanical (e.g., compressed air), electrochemical (e.g., lithium-ion batteries), electrical (e.g., supercapacitors), thermal (e.g., molten salts) and chemical (e.g., hydrogen).[6]

Apart from the actual storage of energy and increased renewable energy integration, electricity storage systems have additional advantages of reduced electricity costs, enhanced grid reliability and improved grid resilience.[7] Other advantages include reduction of pollution, through the energy transition from fossil fuels to renewable energy technologies.[8]

Despite the benefits of battery storage, there are a number of barriers to their widespread adoption and these include high initial costs, regulatory and market

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[1] Ioannis N Kessides and Michael Toman, 'The Global Energy Challenge'[2011] World Bank Blogs
[2] Piotr Bojek, 'Renewables 2024' [2025] International Energy Agency
[3] Filho, et al, 'Strategic Guidelines for Battery Energy Storage System Deployment: Regulatory Framework, Incentives, and Market Planning' [2023]
[4] Russo et al., 'Forecasting the inevitable: A review on the impacts of climate change on renewable energy resources' [2022] Sustainable Energy Technologies and Assessments, Volume 52, Part C, August 2022, 102283
[5] Parra D and Mauger R, 'A new dawn for energy storage: An interdisciplinary legal and techno-economic analysis of the new EU legal framework' [2022] Energy Policy 171 (2022) 113262, Elsevier
[6] Luo, X., et al 'Overview of current development in electrical energy storage technologies and the application potential in power system operation' [2015] Appl. Energy
[7] Gharehveran et al., 'Optimizing Energy Storage Solutions for Grid Resilience: A Comprehensive Overview' [2025] Intechopen
[8] Piotr Bojek, 'Renewables 2024' [2025] International Energy Agency

challenges, and technical limitations.[9] In the case of Zambia, ambitious policy and regulatory shifts have been pronounced in Zambia as part of the measures to promote renewable energy integration in the wake of the power deficit the country has suffered arising from climate changes.[10] Government measures that have been implemented include the open access regime for electricity which enable all sector players to access to the transmission and distribution grid without restrictions[11] deregulation of renewable energy resources with installed capacity of 5 MW and below, the net metering framework which allows consumers to generate their own electricity from renewable sources and offset their consumption from the electricity grid,[12] enactment of the **Electricity Act**[13] and the **Energy Regulation Act**,[14] the introduction of the Ministry of Green Economy and Environment which is responsible for biosafety, climate change, environmental protection, renewable energy, and green industrial policy.[15]

Despite all these efforts by the Government of Zambia, there has been no deployment of utility scale energy storage systems across the country. One of the reasons that can be cited would be the lack of a clear legal and regulatory framework that, firstly, prescribes the deployment of such utility energy storage systems and, secondly, protects the investments directed towards such systems.

This study seeks to delve into the legal and regulatory frameworks for electricity storage technologies in Zambia and their readiness for changing power system requirements.

1.2. Background of the Study

Despite the crucial cooperation between energy storage systems and the intermittent renewable energy resources, there is a significant challenge in most countries when it comes to accepting solutions that involve the integration of such energy storage systems into their regulatory frameworks.[16]

Regulatory frameworks tend to lag behind while the energy sector rapidly changes.[17] The regulatory regime as it relates to battery energy storage systems seems not to be unified, compared to conventional power systems where prudent industry practices

[9] World Bank Group, 'Guidelines to implement battery energy storage systems under public-private partnership structures' [2023] World Bank Group
[10] Reagan Gates, 'Renewable Energy Laws and Regulations Zambia 2025' [2025] ICLG
[11] The Electricity (Open Access) Regulations, Statutory Instrument No. 40 of 2024
[12] ibid
[13] Act No. 11 of 2019
[14] Act No. 12 of 2019
[15] Gazette Notice No. 1123 of 2021
[16] Filho, et al, 'Strategic Guidelines for Battery Energy Storage System Deployment: Regulatory Framework, Incentives, and Market Planning' [2023]
[17] Draco, C. and Gatto, A., 'Policy, regulation effectiveness, and sustainability in the energy sector: A worldwide interval-based composite indicator' [2022] Energy Policy, Volume 167,

already exist and are recognised globally. For hydropower plants and thermal power plants, standard regulatory frameworks have been established and government by international practices such as the IEEE, IEC and NERC.

Some jurisdictions treat energy storage systems like conventional generators for licensing purposes while other countries have developed a more comprehensive frameworks considering aspects like technology-neutral regulations, clear connection systems, and addressing the unique dual role of energy storage systems as both generation and consumption.[18] The energy storage systems are required to comply with existing regulations such as building codes and fire safety codes including environmental sustainability codes. The systems may also be required to meet product safety regulations for grid integration, health and safety requirements. Other legal issues would emanate from commercial forces existing in the electricity industry and these include tariff setting, tariff adjustment and return on investment. These may also extend into investment protection and promotions measures adopted by the specific jurisdiction.

To circumvent regulatory regimes that are averse to the deployment of energy storage systems, some regulatory authorities have opted to shift storage systems from one regulatory regime to a friendlier regime. An example is the 2019 announcement in the United Kingdom that exempted almost all battery storage projects from the Nationally Significant Infrastructure Projects (NSIPs) regime by redirecting the regulation of battery energy storage systems to the **Town and Country Planning Act (1990)**. This significantly reduced the development time and cost investment typically required under the NSIP regime (The Infrastructure Planning (Electricity Storage Facilities), Order 2020).

While the UK has made significant changes in the deployment of energy storage systems, Zambia a beneficially of the British legal system, has however lagged behind. The deployment of renewable energy technologies in England is rapidly expanding.
As of 2024, renewables accounted for over half of the UK's electricity generation for the country reaching to about 50.8% with wind contributing about 29.5% while solar and other sources making up the remainder.[19] For the year 2030, the United Kingdom has target to reach up to 95% of electricity generation from clean sources. Under the Integrated Resource Plan,[20] the Government of Zambia intends to increase the countries generation from to 10,013 MW by 2030. Renewable energy deployment is expected to migrate from 3% to 33% within that period.

There is therefore need to assess the adequacy of the existing legal and regulatory frameworks regarding energy storage systems and the effectiveness of the

[18] Parra D and Mauger R, 'A new dawn for energy storage: An interdisciplinary legal and techno-economic analysis of the new EU legal framework' [2022] Energy Policy 171 (2022) 113262, Elsevier
[19] Green M., 'Renewables generated 50.8% of the UK's electricity in 2024, Solar Power Portal' [2025]
[20] GRZ, 'Integrated Resource Plant' [2023] Government of the Republic of Zambia

frameworks in contributing to the overall objective of increasing the deployment of renewable energy technologies and enhancing the participation of the energy sector in national development.

1.3. Problem Statement

The current law in Zambia, as applied to the interconnected power system, is based on legacy engineering principles in which at every instance, the electrical energy produced is matched with the consumption (power balance). For instance, despite the **Electricity Act**[21] acknowledging the existence of renewable energy technologies, it does not expressly take cognisance of the role of energy storage systems within the power systems. Worse off, the **Electricity (Grid Code) Regulations**[22] is entirely premised on legacy power generation assets and does not include renewable energy technologies nor battery energy storage systems. Plans are underway by the Government to review and update these codes and regulations, however, the timelines remain unknown.

Further, despite the **Energy Regulation Act**[23] placing a mandate on the Energy Regulations Board (ERB) to recommend the issuance of regulations by the Minister as a response to changes in the sector, the Minister of Energy is yet to issue a specific regulation concerning the novel technology of storage systems. Further, no standards have been promulgated within the Zambian context except for **ZS 005** a compulsory standard which pertains to lead acid batteries. This standard is of limited application in the electricity industry as it is not used in utility scale battery energy storage systems for reasons of inefficiency and environmental concerns.

Zambia recently published the **Integrated Resource Plan (IRP)** regarding the development and financing of the power system from 2023 to 2050. The IRP concludes that energy storage is the cornerstone of a resilient, sustainable, and green energy future for Zambia and by embracing innovative storage solutions, Zambia is taking a decisive step toward a cleaner, more reliable, and prosperous energy sector.[24] The IRP does not however give a guide on the legal issues concerning energy storage systems and the challenges thereof.

Apart from the industry specific regulatory regimes, deployment of power infrastructure requires various statutory approvals including under the **Environmental Management Act**,[25] **Town and Country Planning Act**,[26] **Factories Act**,[27]

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[21] No. 11 of 2019
[22] Statutory Instrument No. 79 of 2013
[23] No. 12 of 2019
[24] GRZ, 'Integrated Resource Plant' [2023] Government of the Republic of Zambia
[25] Act No. 12 of 2011
[26] Chapter 283 of the Laws of Zambia
[27] Chapter 441 of the Laws of Zambia

Occupational Health and Safety Act,[28] among others. These statutes were designed prior to the emergent of renewable energy resources and the associated storage systems and therefore are non-responsive in matters concerning utility scale battery energy storage systems.

Without a clear legal and regulatory regime, the deployment of energy storage systems is likely to continue facing impediments thereby diminishing the impact the various measures Government is putting in place in eliminating the energy deficiency.

1.4. Study Objectives

1.4.1. Overall Objective

The overall objective of this study is to assess the legal and regulatory frameworks for electricity storage technologies in Zambia and their readiness for changing power system requirements.

1.4.2. Specific Objectives

The specific objectives of the study are:

1. To highlight the legal and regulatory frameworks regarding utility scale battery energy storage systems in Zambia;

2. To undertake a comparative analysis of the existing legal and regulatory frameworks regarding utility scale battery energy storage systems and the adequacy thereof to establish a conducive environment for the deployment of the technologies; and

3. To highlight modifications that could be made on the existing legal and regulatory frameworks in Zambia in order to create a conducive environment for the integration of Battery Energy Storage Systems in the future power system for the country.

1.5. Research Questions

In addressing the above objectives, the following questions will be answered:

1. What legal and regulatory frameworks are applicable to utility scale energy storage systems in Zambia and other Jurisdictions?

[28] Act No. 36 of 2010

2. Are the legal and regulatory frameworks in Zambia adequate for the seamless integration of utility scale energy storage systems into the electricity industry?

3. What mitigation measures have been implemented in other jurisdictions to ensure the legal and regulatory frameworks are supportive of the integration of battery energy storage systems?

4. What measures can be implemented to support the integration of Battery Energy Storage Systems in the Zambian power system

1.6. Significance of the Study

The Government of Zambia has set an ambitious development agenda that is expected to boost its productivity in agriculture, mining and manufacturing.[29] Key to these processes is the availability of reliable and secure electricity. With the adverse hydrological situation that the country has grappled with in the last 6 years, renewable energy technologies are expected to take up a critical role to the realisation of the country's developmental agenda.

Renewable energy technologies however have a serious deficiency as they are highly dependent on weather conditions.[30] The quantum of power generated from renewable energy dependents on the variability of the weather. A solution to this problem is the introduction of energy storage systems.[31] These systems store energy while the weather conditions are favourable and at a later stage begin to discharge the energy for consumption even when favourable weather conditions have rescinded. The energy storage systems thus assume a dual role of being a power consumer during charging and a power generator during discharging. This dual role makes it difficult for legal and regulatory purposes as existing laws are premised on distinct functionality of load and generator and not both. One way is to apply the law as it applies to loads during the charging phase and then apply another set of law when the system is discharging. This approach is however not practical as the charge and discharge events occur repeatedly at short time scales.

In order to expedite Zambia's drive towards socioeconomic development for all, there is need to review the existing laws and promote the implementation of renewable energy technologies that are backed by well-regulated energy storage systems.

The outcomes of this study are expected to assist decision makers in aligning the legal frameworks with the dynamic requirements of the electricity industry.

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[29] GRZ, 'Integrated Resource Plant' [2023] Government of the Republic of Zambia

[30] Russo et al., 'Forecasting the inevitable: A review on the impacts of climate change on renewable energy resources' [2022] Sustainable Energy Technologies and Assessments, Volume 52, Part C, August 2022, 102283

[31] Rankl, F., Walker, A., and Rowe, G., 'Battery energy storage systems (BESS), UK Parliament House of Commons Library' [2024]

1.7. Scope of the Study

This study is limited to the legal and regulatory frameworks applicable to utility scale energy storage systems in Zambia. The regulatory regimes may include international instruments that Zambia has adopted or such instruments that form prudent industry practices.

1.8. Definition of Key Terms and Acronyms

For purposes of this study, the following definition where adopted:

"Bankability" means the determination by lenders, banks and other financing institutions of the viability and attractiveness of a project for advancement of funds, following a financial, technical, and legal feasibility assessment, which includes establishing that the project has a stable revenue stream based on proven technology and is being managed by a prudent and creditworthy entity, and that the undertaking is supported and provided for by the law in the jurisdiction in which such undertaking will be established;

"BESS" means Battery Energy Storage System;

"Energy Storage System" means a technology that has ability to capture and store energy for later use, not to include a stand-alone 12-volt car battery or an electric motor vehicle;

"Grid Code" means Electricity (Grid Code) Regulations, 2013[32] as amended from time to time;

"Integrate" means the introduction and connection of a new electricity equipment onto an existing interconnected power system;

"Legal and Regulatory Framework" means system of laws, rules, and regulations that governs a specific industry, sector, or jurisdiction;

"Power System" means a system of various electrical components and equipment so designed as to generate, transmit, and distribute electrical energy;

"Prudent industry practice" means generally accepted and reasonable methods, techniques, and standards commonly used within a specific industry;

"Regulatee" means a person or organisation that is subject to regulation;

"Regulatory framework" means a legal system for regulating a business activity;

"Renewable energy" means energy derived from natural resources and have the ability to replenish themselves; and

[32] Statutory Instrument No. 79 of 2013

“Utility Scale” means large-scale energy undertakings with a capacity to produce electricity in the range of one megawatt (MW) and above;

1.9. Literature Review

According to IRENA,[33] the first step towards properly valuing energy storage, is creating appropriate regulations that recognise and classify the benefits of storage because it will allow for greater transparency for developers and lenders alike to understand guaranteed revenue streams. These regulations and definitions will likely depart from the traditional form of classification and valuation due to the flexibility that comes with energy storage.[34] Inadequate regulations and policies can lead to energy storage systems not receiving adequate compensation for the vast services they supply, thus deterring significant investment opportunities that were available to renewable energy resources.[35]

The first key challenge to the widespread development of energy storage is that there is no universally accepted definition or classification within the traditional categories of utility regulation.[36] The key issue is that the flexibility and multiple uses of storage systems means that it cannot be reduced to either generation or transmission. Instead, battery storage is generation, transmission, load, and demand response because it dispatches and transports electricity, withdraws from the grid, and mitigates the demand on the grid.[37] A particular classification of energy storage could also determine which regulatory body maintains jurisdiction over it. For example, in the United States, the Federal Energy Regulatory Commission (FERC) maintains jurisdiction over battery storage when it is considered either transmission of electricity in interstate commerce, the sale of electricity at wholesale in interstate commerce, or distinguished as sale-for-resale such as energy arbitrage (Watson, 2025). Conversely, energy storage is subject to state regulation when it is considered a generation resource.[38] FERC has also assumed exclusive jurisdiction over distribution level battery storage at the distribution level because it may involve the buying and selling of electricity at wholesale and retail level.

The United Kingdom has an installed capacity of around 10 GWh.[39] Installing a grid-scale energy storage system in the United Kingdom requires planning consent[40] and

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33 IRENA, ‘Electricity Storage Valuation Framework: Assessing system value and ensuring project viability’ [2020] International Renewable Energy Agency

34 Parra D and Mauger R, ‘A new dawn for energy storage: An interdisciplinary legal and techno-economic analysis of the new EU legal framework’ [2022] Energy Policy 171 (2022) 113262, Elsevier

35 IRENA, ‘Electricity Storage Valuation Framework: Assessing system value and ensuring project viability’ [2020] International Renewable Energy Agency

36 Watson, K, ‘An Overview of Energy Storage Laws and Policies in the US, CleanTech Law Partners’ [2025]

37 Amir et al., ‘Battery energy storage systems and demand response applied to power system frequency control’ [2022]. International Journal of Electrical Power & Energy Systems

38 Watson, K, ‘An Overview of Energy Storage Laws and Policies in the US, CleanTech Law Partners’ [2025]

39 Daniel Sutherland, ‘Stacking up the storage: where the UK battery market stands in 2025’

40 Rankl, F., Walker, A., and Rowe, G., ‘Battery energy storage systems (BESS), UK Parliament House of Commons Library’ [2024]

since the planning function is highly devolved, decision-making rules for energy storage differs across the various authorities. For example, in England and Wales, decisions on energy storage systems, regardless of their capacity, are made by local planning authorities while in Scotland and Northern Ireland, consent is required from either ministers or the planning authority depending on their storage capacity. Depending on its capacity, a generating licence to operate is required. Generating licences are issued by Office of Gas and Electricity Market (Ofgem) in Great Britain while the utility regulator issues this license in Northern Ireland. In general, nonetheless, there are no laws that govern the safety of energy storage systems specifically, however, individual technologies may have to adhere to product safety regulations, and grid-scale facilities may also have to comply with fire safety requirements and health and safety laws.[41]

In Spain, storage facilities have been incorporated under generation facilities and therefore the approval processes for generation assets apply to storage systems as much. Regulations on access and connection to the electricity grid are expressly provide in case of hybridisation.[42] In the case of Spain, the energy storage facilities are required to be registered in the Administrative Register of Electricity Production Installations.[43] In Spain, the bases for environmental assessments for any project that may impact the environment are prescribed under Law 21/2013.[44] The scope and application of Law 21/2013 does has not provide for energy storage systems unless it is clear that they are likely to affect protected natural areas or cultural heritage. With regard to climate change and energy transition, the Spanish Law 7/2021 envisages the development of new regulations applicable to storage key areas such as the: (i) establishment of a legal framework for energy storage operators; (ii) streamlining of administrative procedures (iii) harmonisation of operating procedures for system operations to include storage systems; and (iv) inclusion of energy storage systems in transmission system planning and expansion, among others. Some of these modifications have been envisaged under the draft Grid Code in Zambia. Spain has a reported 9 GWh of operational battery energy storage capacity.[45]

For Netherlands, the supply, installation and maintenance of the lithium-ion battery energy storage systems are governed by a range of laws and regulations that pertain to areas including (1) environmental management; (2) zoning; (3) construction; (4) external safety; and (5) transportation.[46] There is no specific law that relates to utility scale battery energy storage systems. These regulations are however expected to be

[41] ibid
[42] Osborne Clarke, 'Energy storage and its regulation' [2023]
[43] Article 27.2 of the Royal Decree 1183/2020, of 29 December, on access and connection to the electricity transmission and distribution networks
[44] Law 21/2013, the Law on Environmental Assessment
[45] Coen Hutters and Pablo Ruiz, 'Backup power for Europe - part 4: Spain's BESS market is heating up'
[46] Kok T. and Jacobs V., 'Regulatory framework for lithium-Ion battery storage systems' [2023] Lexology

incorporated in the upcoming Energy Act which is expected to replace the old Electricity and Gas Acts around 2026[47]

In South Africa, the legal framework for battery energy storage primarily involves environmental regulations and the regulations issued by the National Energy Regulator (NERSA). In 2024, the Minister of Forestry, Fisheries and the Environment issued Government Gazette No. 50387 of 2024, which essentially excluded activities associated with the development and expansion of battery storage facilities from the requirement to obtain an environmental authorisation. This was a boost in the rapid deployment of energy storage systems in South Africa. Currently South Africa has around 1.3 GWh of battery energy storage ranking it at No. 7 globally.[48]

In the case of Zambia, the closest mention of energy storage systems is found in future power projects that have been proposed by Africa GreenCo[49], GEI Energy[50] and other initiatives by Government and the private sector. So far, no deliberate measures have been put in place to directly address the legal issues concerning battery energy storage systems.

1.10. Research Gap

The vast of the electricity industry in Zambia is highly regulated with frameworks enshrined in the Electricity Act and Energy Regulations act and the statutory instruments thereof. At the time these frameworks where crafted, none of them envisaged the outburst of the application of battery energy storage system nor the technologies that heavily rely on utility scale energy storage media. The legal instruments in existence thus give no express mention of battery storage and how such technologies could be established nor regulated. This has also complicated the treatment battery systems under commercial agreements in the electricity.

1.11. Methodology

1.11.1. Research Approach

This study makes use of qualitative doctrinal research methodology. Due to the combination of legal and engineering principles of the topic, reliance will be made on both the exploration of regulatory frameworks, incentives and other policy measures aimed at ensuring that the engineering principles are accommodated within the tenets of the law. The research is grounded in a critical analysis of both primary and secondary sources to evaluate the extent to which Zambia's law is ready for the

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[47] Van Der Weijden C. and Boudens M. '(Dutch energy regulator to tolerate cable pooling for batteries'

[48] Smart Propel, 'Battery Energy Storage Critical to Stabilise South Africa's Grid'

[49] Melo Media, 'GreenCo Invites Bids for 25MW Battery Energy Storage Project in Zambia' [2025]

[50] Murray, C. 'Developer GEI and EPC firm YEO launching solar-plus-storage project in Zambia with 20MWh BESS, Energy Storage News'

deployment of renewable energy sources backed by energy storage systems. This will involve conducting bibliographical research within existing legal and scientific publications.

1.11.2. Research Design

The research will adopt an integrated approach, primarily focusing on library as well as desk research for data collection, and the data analysis process entails a critical and thorough review and description of applicable legal provisions.

1.11.3. Sample Size

This research will be targeted at all persons with credible knowledge and expertise on the subject matter and institutions of authority. These include public bodies, legal practitioners in the energy sector and industry players in battery energy storage.

1.11.4. Sampling Technique

This research will employ a purposive technique as well as the snowball technique with the aim of obtaining the most accurate and credible up to date information from reliable and trustworthy institutions and experts.

1.12. Ethical Consideration

In consideration of ethical requirements of research, permission will be obtained from the UNILUS Research Ethics Committee. Individuals and institutions from which information will be obtained will be required to give their express consent as to their participation and use of information. Further consideration will be given to academic writing requirements such as referencing and acknowledgement of works by other authors.

1.13. Research Outline

CHAPTER ONE presents the introductory sections of the report outlining the significance of the study, the objectives and the approaches adopted.

CHAPTER TWO, will assess the legal and regulatory frameworks that are applicable in energy storage systems in Zambia.

CHAPTER THREE, will assess the legal and regulatory frameworks that are applicable in energy storage systems in other jurisdictions.

CHAPTER FOUR, will focus on identifying gaps in the legal and regulatory frameworks in Zambia and seek to identify mitigation measures that have been implemented in other jurisdictions.

CHAPTER FIVE, will present a summation of the research and derive conclusions. The Chapter will also provide recommendations that will aid in solving the legal challenges limiting the deployment of energy storage systems in Zambia.

1.14. Research Timelines

ACTIVITY	DATE	DURATION
Submission And Completion Of Chapter 1	28th July 2025	2 weeks
Submission Of Chapter 2 to supervisor	15th August 2025	2 weeks
Submission of Chapter 3 to supervisor	5th September 2025	3 weeks
Submission of Chapter 4 to supervisor	3rd October 2025	4 weeks
Submission of Chapter 5 to supervisor	23rd October 2025	3 weeks
Submission of first draft to supervisor	31st October 2025	1 week
Submission of Second Draft to supervisor	7th November 2025	1 week
Deadline for submission of soft copy dissertation for marking	14th November 2025	1 day
Publication of results	15th January 2026	1 day

CHAPTER 2

LEGAL AND REGULATORY FRAMEWORKS THAT ARE APPLICABLE IN ENERGY STORAGE SYSTEMS IN ZAMBIA AND OTHER JURISDICTIONS

This chapter highlights the legal and regulatory frameworks that govern the energy sector in Zambia as applied to Battery Energy Storage systems. The chapter highlights the importance of an effective regulatory framework.

2.1. Legal and Regulatory Frameworks

A legal and regulatory framework is a system of laws, rules, and regulations governing a particular area, such as a country, industry, or organization. Legal and regulatory frameworks are more specific than constitutional provisions but establish general obligations and principles leaving the task of implement additional legislation and other specific measures to the respective governing authorities. A well-established legal and regulatory framework identifies and defines the national competent authority and the roles of governmental agencies in particular domains thereby forming the foundational component of an effective and well-functioning administrative.

Globally and historically, the electricity industry has been a subject of serious regulation due to its overall impact on the health and safety of the people within its value chain. And since, the industry is a major economic undertaking, an effective legal and regulatory framework remains necessary in administering commercial arrangements and promotion of fairness and competition within the industry. Furthermore, such effective frameworks are necessary to derisk this capital-intensive industry.

Risks in the electricity industry stem from contractually arrangements within the market to political risks and force majeure events that covered the wider business environment. A poor legal and regulatory framework implies huge risks and the mitigation measures will most likely lead to higher cost of financing. Where risks are deemed to be high, investors will have to take out insurance and escrow accounts and most often, lending institutions would call for higher interest rates and shorter repayment period. On the other hand, poor countries, in which these infrastructures are critical, will be required to provide fiscal and non-fiscal incentives such as tax waivers, waivers of sovereign immunity and other contractual obligations, which further diminish the ability of these countries to attain socioeconomic development for their people.

2.2. Importance of Regulations

The regulatory function is a role only performed by the state. In order to execute this function effectively, the regulatory function is often granted to an institution that has been given a degree of independence with regard to government. Regulations are crucial to ensure consumer protection, safety, reliability, and fair competition. The importance of regulations can be summarised as follows:

2.2.1. Protection of Consumers

Regulations protect consumers by setting price controls and service standards, safeguard the public and environment by enforcing safety and pollution standards.

2.2.2. Establish a Stable Environment

Regulations promote a stable market by ensuring service providers can operate efficiently while providing a reasonable return on investment. By establishing clear rules and preventing unfair practices, investors are likely to be attracted to a given industry.

2.2.3. Promote Fairness and Competition

Regulations to promote fairness and competition by creating an open marketplace that does not deter new entrants, preventing market collusion and ensuring a level playing field.

2.2.4. Promote Investments

It also sets out clear rules and a stable regulatory environment that boosts investor confidence thereby making the sector more attractive for private investment an element which is crucial for developing infrastructure and expanding energy access.

2.3. Types of Regulation

There are many different types of regulations with varying degrees of advantages and disadvantages. Examples of the types of regulations include:

2.3.1. Command and Control (C&C)

This regulatory regime is premised on the imposition of strict legal standards with sanctions, where such standards are not met. The cornerstone to this regime is the law itself. Standards can be set either through legislation, or by regulators so empowered. Certain types of activities are expressly forbidden or enforced by law. This gives a decisive position by the government regarding a particular activity.

The command and control approach can excessive and inflexible including the following challenges:

1. **Regulatory Capture**

   There is close coordination between the regulator and the regulatee. This close relationship would compromise the objectivity of the regulator such that the regulator then begins to operate in the interests of the regulatee and not of the public.[51] This is common in developing countries where the legal frameworks are still in infancy. The ERB[52] admits that regulatory capture has the effect of poor regulatory enforcement and eventual loss of confidence by the public. The Committee on Health, Community Development and Social Services on the Ratification of the Treaty for the Establishment of the African Medicines Agency in its submission to parliament noted that a potential of regulatory capture existed if the proposed African Medicines Agency (AMA) was to be financed with support from the European Union. The situation would lead to AMA's regulatory processes being influenced by powerful pharmaceutical interests and potentially leading to regulatory capture or bias towards certain industry players. This could in turn undermine the Agency's independence and effectiveness in safeguarding public health interests.[53]

2. **Legalism and Abuse**

   The command and control approach is inherently complex, inflexible and intrusive. For industries like the electricity sector which is subject to rapid changes, it is often difficult to derive precise industry rules. Technology is changing faster than the timeframes in which a regulatory regime can be implemented. Further, due to its over reliance on legislative processes, the direct involvement of politicians in the command and control regime leads to rules and regulatory practices drawn up in response to specific situations or areas of concern within political cycles. The regulatory regime tends to respond to the prevailing political landscape.

3. **Setting of Standards**

   Establishment of standards requires extensive consultations and often competing interest arise. It thus becomes difficult to set an appropriate standard that meets the expectation of all the parties involved. An example would be the establishment of appropriate pollution levels for coal fired power plants versus the requirement for electricity to support economic activities. This dilemma diminishes the rate of compliance.

[51] World Bank Group, 'Anticorruption in transition: Contribution to the policy debate' [2000]. World Bank Publications. ISBN 9780821348024
[52] ERB, 'ERB Integrity Committee' https://www.erb.org.zm/ic
[53] National Assembly of Zambia, 'Committee on Health, Community Development and Social Services on the Ratification of the Treaty for the Establishment of the African Medicines Agency, [2024]

4. **Enforcement**

   The complexity of the rule under the command and control approach leads to higher chances that such rules may not encompass all possible activities. This makes enforcement difficult for the regulatory authorities due to the diversity of industry practices. The complexity in the rules also mean that the interpretations may vary leading to a plethora of litigation over enforcements. The rules of enforcement will have to be left to the courts for interpretation. The case of the **People v the Attorney General and Energy Regulation Board**[54] outlines a situation where the wording of **Statutory Instrument No. 57 of 2020** left no room for the aggrieved party to negotiate new terms.

5. **Constraining of Innovation**

   Command and control regulations are often blamed for not being cost effective. There are imposed and the industry is required to comply even without the consideration of the economic impacts. This limits the level of innovation in an industry. Case in point is the **People v the Attorney General** where a regulatory instrument was issued to the detriment of the owner of the transmission asset.[55]

2.3.2. Self-Regulation

Self-regulation can be viewed as an introspective command and control where the regulatee regulates himself. The business or industry players tend to form their own rules of performance which they themselves monitor and enforce, with some level of government oversight. Self-regulation in essence is a pre-emptive measure by businesses to avoid the strong intervention by government. It is in the interest of the players to ensure the system works as they avoid possible takeover by the state.

One key advantage is that the industry players themselves are experts and are likely to derive rules that are comprehensive. It does not require legislation hence avoid the long administrative processes of law development. On the down side, self-regulation is closed to outside scrutiny and therefore a subject of undemocratic tendencies and abuse by the influential players within the industry.

2.3.3. Incentive-Based Regulation

The goal behind the incentive-based regimes is to make a regulated entity reduce or halt an activity deemed undesirable by taxing it or rewarding it. This approach leaves little room for regulatory discretion and thus dramatically diminishes the risk of regulatory capture. However, the company is still able to make a voluntary decision whether to comply with the rule, or it prefers to face the imposed punishment.

[54] [2020]HP 0575
[55] Ibid

2.3.4. Market Controls

Market-based regulations are aimed at minimising regulatory interference in daily operations of the industry. Common market-based mechanisms include:

i Regulations through Competition Laws

Competition laws ensure diversity in the market and eliminate predatory pricing or cross-subsidisation. This approach is preferred to command and control regulation as it is considered to be less intrusive and cost effective. Under competition laws, disputes are resolved before the court as opposed to a publicly funded tribunal or agency.

Reliance on competition laws gives rise to two major challenges and these that (1) competition laws only establish broad principles with no specific technical problems in purview and, (2) under courts, a less than expert judgement may be obtained as opposed to a decision taken by an expert regulatory agency.

ii Regulation by Contract

Government normally have such buying power over certain transactions that they can dictate conditions in contracts with businesses with whom they contract. These contractual conditions can then be used as policy instruments to arrive at desirable ends.

Regulation by contract is a short-term solution and more suited for rapidly increasing regulatory robustness. In the medium term, these measures need to be reinforced and eventually replaced by more permanent regulatory measures in the long term.

iii Regulations Through Tradable Permits

The European Emissions Trading Scheme[56] is a typical example of a tradeable permits system. Under this scheme, a specified level of acceptable emissions is set by the government, allocation of allowances up to the set limit are then allocated to market participants. The participants can then opt to reduce their emissions below the allocated limit then trade their excess allowances. They could buy allowances to enable them exceed the limits. Else, the participants may choose to exceed the limit and pay the prescribed penalty.

iv Disclosure Regulation

Disclosure regulations require that producers state the source or content of their products. The consumer is then allowed to choose a preferred source and

[56] EU ETS – EU Emissions Trading System

composition of a product. The approach is more reliant on integrity and level of disclosure by the service provider. The consumer is expected to make a prudent choice.

2.4. Legal and Regulatory Framework for the Electricity Sector In Zambia

The legal and regulatory framework in Zambia is premised on the command-and-control approach. It comprises a mix of mainly statutory law and common law. Judicial decisions in the energy sector such as the cases of the **People v the Attorney General and Energy Regulations Board**[57] and **Kansanshi Mining v The Attorney General and ZESCO Limited**[58] demonstrate the operation of common law in the electricity industry. The frameworks are discussed as follows:

2.4.1. Legal Frameworks Governing the Electricity Sector In Zambia

a. Constitution

Electricity is considered an economic enabler. Under **Article 10**,[59] the Constitution of Zambia demands that Government creates an economic environment which encourages individual initiative and self-reliance among the people, so as to promote investment, employment and wealth. Further, **Article 255(g)**[60] requires that the management and development of the country's environment and natural resources should be governed by the principle of energy saving and sustainable use of renewable energy sources. Therefore, the foundational responsibility to manage the electricity sector is placed on the Government by the Constitution.

b. Electricity Act, No. 11 of 2019

The objectives of the Electricity Act[61] are to regulate generation, transmission, distribution and supply of electricity so as to enhance the security and reliability of power supply in the country. The Act also provides for the sale and purchase of electricity within and outside Zambia.[62] Some of the provisions under the Act include:

a establishment of roles and responsibilities of the various players in the electricity industry;
b measures aimed at facilitating adequate levels of investment in the electricity sector;
c the introduction of a multi-year tariff adjustment framework in the sector;
d promotion of transparent identification and allocation of risks, costs and revenues in the sector; and

[57] [2020] HP 0575
[58] CAZ/08/034/2016
[59] Constitution (Amendment) Act, No. 2 of 2016
[60] Ibid
[61] Act No. 11 of 2019
[62] Ibid

e safety and protection of consumers of electricity and the public;

c. Energy Regulation Act 2019

The main purpose of the Energy Regulation Act[63] was to establish a regulatory framework for the energy sector. The provisions of the Act include the establishment of a framework for the licensing of enterprises, continuation of the existence of the ERB and re-define the mandate of the ERB.

d. Zambia Grid Code (ZAGC)

The ZAGC was approved by the Energy Regulation Board in 2007, and was gazette in August 2013, through the Electricity (Grid Code) Regulations, 2013, Statutory Instrument No. 79 of 2013. The ZAGC is aimed at facilitating open and non-discriminatory access to the transmission system and enhancing efficiency and rapid electrification of the country.

2.4.2. Institutional Arrangement

a. Ministry of Energy

The Ministry of Energy (MOE) was established under Government Gazette Notice No. 1123 of 2021. The Ministry is responsible for the development and management of energy resources in a sustainable manner. The MOE is responsible for the formulation and implementation of the national energy policy, coordination of stakeholders in the sector, the development of a national energy strategy and plan, the monitoring and evaluation of current policies, and the development of new energy programs. Statutory bodies under the supervision of the Ministry of Energy include the Energy Regulation Board, Zambezi River Authority and Rural Electrification Authority. ZESCO Limited the state utility is under the supervision of the Ministry of Energy however, it is established under the Companies Act.[64]

b. Energy Regulation Board (ERB)

The Energy Regulatory Board was established under the Energy Regulation Act Chapter 436 of the Laws of Zambia. The continued existence of the ERB has been echoed in the Energy Regulation Act of 2019. The ERB is mandated to regulate the energy sector in order to ensure the efficient provision of reliable and quality energy services and products. ERB regulates the energy sector is achieved through issuance of appropriate licences.

[63] Act No. 12 of 2019
[64] Act No. 10 of 2017

c. Zambia Environmental Management Agency (ZEMA)

The Zambia Environmental Management Agency advises on environmental policy formulation, makes recommendations for the sustainable management of the environment, ensures the integration of environmental concerns in overall national planning, reviews environmental impact assessment (EIA) and strategic environmental assessment (SEA) reports, and facilitates public access to environmental information in the Country.

2.4.3. Permitting Process

a. Zambia Development Agency Investment License

Until recently, the Zambia Development Agency (ZDA) used to issue Investment Promotion and Protection Agreements (IPPA) that offered protection of the investments in Zambia. The IPPA has since been replaced with an investment licence that is renewed annually.

The Investment licenses is accompanied by investment protection mechanisms and incentives that can be accessed by respective sectors. Investors in the energy sector are required to hold a valid investment license issued by ZDA in order to access the subsequent services and protections granted by Government.

b. ERB Construction License

The Energy Regulation Act[65] eliminated the Investment Endorsement Licence that was previously being issued by the ERB. The Investment Endorsement Licence was replaced with a Construction License. This licence is issuance to investors seeking to establish energy infrastructure prior to the acquisition of a substantive operating licence.

The Construction Permit is an assurance that once the facility is built in accordance with the design specifications and in compliance with relevant standards, the ERB shall issue substantive licences for generation, distribution or transmission, as the case may be.

c. ERB Operational Licenses

In Zambia, the operation of generation, transmission, distribution and/or trading activities require specific licenses from the ERB. The licenses outline certain conditions which govern the operational requirements for the interconnected power system, including adherence to the requirements of the Environmental Management Act.[66]

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[65] Act No.12 of 2019
[66] Act No. 11 of 2012

While both the Electricity Act[67] and the Energy Regulation Act[68] do not expressly itemise the licenses that can be issued by ERB, Section 10 (1) and (2) of the Energy Regulation Act[69] makes it an offence to establish or operate an enterprise without a license issued by the ERB. Nonetheless, in the electricity sector, the ERB on its website[70] has highlighted the following licenses that it can issue and these are licenses for:

i. Electricity Generation;
ii. Transmission of Electricity;
iii. Distribution of Electricity;
iv. Supply of Electricity;
v. Trading in Electricity;
vi. Operation of the Power System;
vii. Off Grid Generation, Distribution and Supply of Electricity;
viii. Embedded Generation; and
ix. Generation of Electricity for Own Use.

None of these licenses are strictly directed towards energy storage systems or similar technologies.

d. The Environmental Compliance

The **Environment Management Act No. 12 of 2011** as read together with the Environmental Impact Assessment (EIA) Regulations, Statutory Instrument No. 28 of 1997 is imperative that developers of energy infrastructure projects falling under the First and Second Schedules of the (EIA) Regulations must obtain environmental clearance for projects listed. The EIA Regulations classifies projects into two categories. Projects under the First Schedule require that an Environmental Project Brief (EPB) is prepared while projects under the Second Schedule require an Environmental Impact Statement (EIS). The Schedules speak to installed capacities of generation projects and evacuation capacities of transmission assets.

e. Local Planning Authority: Building Permit, Change of Land Use etc

The developer of electricity infrastructure projects are required under the Town and Country Planning Act and the Public Health (Building) Regulations to obtain Planning Permission to develop land and a building permit from the Local Authority to erect a structure. The submitted building plans are scrutinized by the City/Town Council before recommendations to a committee for either outright approval,

[67] No. 11 of 2019
[68] No. 12 of 2019
[69] Ibid
[70] https://www.erb.org.zm/licensing

approval with conditions or disapproval. This is followed by Full Council ratification of grant of Planning Permission to develop and a Building Permit is issued.

A Building Permit allows the developers to start developing within six (6) months failure to which the permit elapses and has to be renewed. Construction should be completed within eighteen (18) months from the date it is granted. Building Permit can only be obtained after approval of the projects from ZEMA.

2.5. Battery Energy Storage Systems

Battery Energy Storage Systems are relatively a new technology and therefore the legal and regulatory landscape for their integrating into the existing national grid is expected to keep evolving. As countries strive to decarbonise their energy systems through renewable energy technologies, regulatory frameworks are expected to play a crucial role for managing the challenges and maximizing the benefits of BESS.[71] Without supportive regulatory frameworks, the full potential of renewable energy sources and BESS in enhancing grid stability may not be realized, hindering the transition to a sustainable energy future[72]

2.5.1. Technological Perspective

From the engineering perspective, a battery energy storage system (BESS) is an electrochemical device that charges (or collects energy) from the grid or a power plant and then discharges that energy at a later time to provide electricity or other grid services when needed.[73]

Key to the engineering perspective is the process of getting electricity from a given source and storing it in a form that can be processed back to electricity at a later stage for usage. This consideration however falls short of the distinct power system classifications that can be commercialised; being generation, transmission and distribution.

Power generation is the process of converting different energy sources into electricity or other usable forms of energy. Key to this understanding is the term energy source which in most cases involves fossil fuels, gravity, solar irradiance, wind power, tidal power, biomass and nuclear reactions. Power transmission on the other hand involves the actual movement of bulk electricity from one location to another through an interconnection of wires. Primarily, transmission involves electricity in motion. Power

[71] Odunayo Abosede Oluokun et al., 'Integrating Renewable Energy Solutions in Urban Infrastructure: A Policy Framework for Sustainable Development' [2024] International Journal of Multidisciplinary Research and Growth Evaluation
[72] Oluwadayomi Akinsooto et al., 'Regulatory policies for enhancing grid stability through the integration of renewable energy and battery energy storage systems' [2024] Frontline Research Journals
[73] Thomas Bowen et al., 'Grid-Scale Battery Storage: Frequently Asked Questions' [2019] National Renewable Energy Laboratory

distribution on the other hand relates entails the final stages in delivering electricity in controlled quantities to the end-users such as industries, homes and business centres.

The benefits of battery energy storage systems extend across the wider electricity supply value chain. At the generation level, battery storage would be used to replace traditional power plants like hydro for water banking or resource conservation. At transmission three benefits arise and these include (1) congestion relief in certain areas of the transmission system that become overloaded during times of higher demand,[74] (2) transmission upgrade deferral in which the need, size, and the urgency of new investment in the transmission systems can be deferred by installing battery storage near the load centre thereby shifting power demand to less congested times, and (3) assist with the reliability and system performance of the transmission lines by maintaining system voltage and providing additional capacity during system faults.

At the distribution level, battery storage reduces the customers demand at peak times especially at an aggregated basis if deployed in a significant amount across the industries, homes and businesses. At this level, when battery storage is paired with solar panels or other distributed energy resources, any additional energy generated during the day or non-peak hours can then be stored and used during peak hours,[75] an initiative being propagated by the Zambian government as Net Metering.[76]

Clearly, the traditional classification of the power system falls short in assigning the battery system to a specific class. The flexibility and multiple uses of battery storage means that it cannot be reduced to either generation or transmission. Instead, battery storage is generation, transmission, load, and demand response because it dispatches and transports electricity, withdraws from the grid, and mitigates the demand on the grid. From this perspective the classification would be immaterial as the benefits and usage of battery storage systems will occur simultaneous across the electricity supply value chain. The challenge arises where specific regulatory licenses and permits are required.

2.5.2. Legal Perspective

When looked at from a legal perspective, the language used in the description and usage of the battery energy storage system becomes paramount. According to Law Insider,[77] the term *electricity storage* would mean the process of deferring the final use of electricity to a moment later than when it was generated, or the conversion of electrical energy into a form of energy which can be stored, the storing of such energy, and the subsequent reconversion of such energy into electrical energy or use as

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[74] Abbas A. Akhil et al., 'DOE/EPRI 2013 Electricity Storage Handbook in Collaboration with NRECA: Sandia Report' [2013] Sandia National Laboratories
[75] Paul Denholm et al., 'The Value of Energy Storage for Grid Applications' [2013] National Renewable Energy Laboratory
[76] Statutory Instrument No. 38 of 2024
[77] Lawinsider Dictionary

another energy carrier. A number of issues therein arise: the legal definitions of the terms storage and conversion.

Whereas to store means to keep (goods, etc.) in safekeeping for future delivery in an unchanged condition, conversion in its literal sense relates to the act of changing from one form to another.[78] When further analysis is applied, *safekeeping* is found to mean the act of protecting something in one's custody[79] while the word *change* would imply making either an essential difference amounting to a loss of original identity or a substitution of one thing for another.[80]

These terms are cardinal as to how specific regulatory provisions are assigned to given components of the power system. Generation licenses are issued to equip that convert energy from one form to another while transmission licences are issued to equipment that are involved in the conveyancing of electricity between localities. On the other hand, distribution licences are issued to equipment involved in the processing and conditioning of power for immediate consumption by the end users. It is thus crucial to assign appropriate definitions to eliminate the risk of doubly regulating same assets but also to ensure that appropriate benefit accrues to service providers whose invested assets transcend through the various classifications.

From a legal perspective the regulatory concern emanates from the fact that globally there is an increase in the deployment of novel power generation technologies which require innovative market structures backed by responsive regulatory frameworks. The positivistic perception would require that the law as it exists should be upheld and this would limit application of new technologies due to the non-existence of appropriate legal frameworks.

The utilitarian approach would, however, would require that reforms are undertaken to maximise social welfare in as far as access to reliable electricity is concerned. But the sociological view requires that the law evolves with society and the prevailing societal needs. In this case, battery energy storage has formed a major part of society and the lawyer needs to participate in enhancing societal welfare by aligning the law. There is need to derive appropriate regulatory frameworks that fits within the context of societal needs.

[78] Black's Law Dictionary
[79] Ibid
[80] Merriam-webster Dictionary

2.6. Legal and Regulatory Frameworks for BESS in Zambia

2.6.1. Electricity Act

In its definition of an electric plant, the Electricity Act includes a plant, equipment, apparatus, appliance or other part used for, or connected with, the generation, transmission, distribution or supply of electricity.

Section 4 (1) makes it mandatory that a person who intends to undertake a feasibility study for the development of a new electricity project, shall apply for an authorisation to the Minister in the prescribed manner and form. Electricity project in itself is defined under as a project that includes development or construction of generation, transmission and distribution infrastructure for the supply of electricity for commercial purposes. The term Enterprise under the act also points to the generation, transmission, distribution and supply of electricity including intermediary power trading.[81]

The consistence in these definitions emphasise the importance of the classifications of the regulated activities and their treatment in regulations. Section 5(1) forbids any person from generating, transmitting, distributing or supplying electricity or trade in electricity as an intermediary or establish or carry on an activity for or related to the generation, transmission, distribution or supply of electricity, trading in electricity as an intermediary or the operation of a transmission or distribution system, except as provided in the Act[82] and the Energy Regulation Act.[83]

Because a battery is connected to the supply of electricity contemplated in Section 5(1), operators of battery systems risk falling into the penalties provided in Section 5(2) where the Act does not provide a regulatory framework for their development and implementation.

There is thus a need to assign battery storage systems to either of the defined classes at the same time avoid double regulation where the definitions transcend. This power is granted to the Minister under Section 52(2)(p) in which regulations can be issued as to the classes of consumers and licenses.

a. Generation

In Section 2, the Electricity Act defines the term *generate* as the production of electricity. Where the meaning production is tied to the bringing into existence or creation,[84] a term properly differentiated from the literal meaning of the word

[81] Act No. 11 of 2019
[82] Ibid
[83] Act No. 12 of 2019
[84] Blacks Law Distionary

conversion. In the definition of electricity, the Act points to electrical energy produced by physical sources of energy such as hydropower, wind power, solar power, petroleum, coal, bio-mass, nuclear energy or any other source. Generally, the Act does not segregate as to the source of generation but grants latitude to power producers to use primary sources of energy that the they consider appropriate for the generation of electricity.[85]

The question then would be whether or not a battery falls within the definitions of a source of energy considering the legal definition of the word source. Source entails being the originator or primary agent of an act, circumstance, or result.[86] Is the battery the source of the electricity or a mere storage facility?

The closes inference of a battery storage being classified as generation for the purpose of the electricity Act is found under Section 6(1)(a) which requires a person who intends to construct and establish a generating station shall do so in accordance with the Act, if the plant is rated at a capacity of two hundred and fifty or more kilowatts for generating, transmitting, transforming, converting or distributing electricity. The emphasis from this provision is the rating in kilowatt and the word converting. Whereas as transformers are used in power conversion, they are rated in volt-amperes whereas batteries are rated in kilowatts and kilowatt-hours based on the number of hours of supply.

Although Section 3(b) of the Act[87] mandates the Energy Regulation Board to provide for diversity in the generation of electricity, the classification of a battery energy storage systems as a power generation facility is yet to be established.

b. Transmission

The Electricity Act defines transmission as the transportation of electricity from the source of electricity production on a transmission system for delivery to distribution network service providers and final consumers.[88] Where a transmission system includes associated equipment at a transmission network service provider substation belonging to a transmission network service provider.

Utility scale battery energy storage systems are normally installed with huge capacities requiring them to be connected to the transmission system and can be owned by Transmission Service Providers. With that background, battery systems may be regarded as an integral part of the transmission system providing part of the ancillary services typical for a transmission service provider.

[85] Section 9(1)(d)
[86] Blacks Law
[87] No. 11 of 2019
[88] Ibid

According to the Grid Code,[89] transmission system means part of the interconnected power system which supplies power in bulk from power stations to distributors and other customers, whereas a power station is a physical location where one or more power generation devices are located. The Grid Code[90] is the key regulatory instrument for the construction and operation of equipment forming part of the transmission system. Despite Section 10(f) requiring that a transmission system operator ensures non-discrimination between system users or classes of system users,[91] the Grid Code makes no deliberate mention of energy storage system.

c. Distribution

The Electricity Act defines distribution as the transportation of electricity on a distribution system for delivery to a consumer. The distribution system itself is defined as a portion of an electricity network which delivers electric energy from transformation points on the transmission network of bulk power system to an enterprise at a voltage whose upper limit is sixty-six kilovolts.[92]

The battery storage system may be installed at the premises of a consumer delivering power at voltages below 66 kV. Despite the provisions of Section 5(1) requiring that a person engaged in activities related to power distribution in Zambia should be licensed, there are no specific licence requirements nor regulatory provisions under the distribution code[93] that relates to battery energy storage systems.

d. Trading

Power trading involves the buying and selling of power within the electricity market. The term is properly suited to intermediary players with no assets forming the power system. This is a new innovation introduced in Zambia under the definition of the term ***"Enterprise"*** in **Section 2 of the Electricity Act**.[94]

Power trading does not necessarily require ownership of assets and is thus clearly contrasted from the participation in the energy market by owners and operators of battery energy storage systems. And again, the reference to a license for system operations is targeted at operators of transmission infrastructure.

[89] Statutory Instrument No. 79 of 2013
[90] Ibid
[91] Ibid
[92] Ibid
[93] Zambian Distribution Grid Code, 2016
[94] No. 11 of 2019

2.6.2. Energy Regulation Act

The Energy Regulation Act,[95] is the principal act that provides for the licensing of activities in the energy sector. An activity under this Act entails a commercial activity, for the purposes of production, generation transmission, distribution or supply of energy, and includes manufacturing, distribution or supply of equipment used for such activities.

The Act establishes the Energy Regulations Board whose main function is to issue licenses under the Act.[96] The ERB is also expected to promote the development and use of new and appropriate technologies in the energy sector.[97] A person cannot not establish or operate an enterprise without a licence issued under this Act as they would be liable for to a fine not exceeding five hundred thousand penalty units or to imprisonment for a term not exceeding five years, or to both.[98] Further Act also grants powers to the ERB to order immediate closure of energy facilities that are operating in contravention with this Act.[99]

From Section 54 of the Energy Regulations Act, the ERB may recommend to the Minister for the issuance of statutory instruments for the better carrying out of the provisions of the Act. One such instrument is Statutory Instrument No. 41 of 2023[100] which classifies storage of energy as part of the definition of an energy facility. The other mention of storage under the regulations is in the passing as it defines qualifying off grid activity and does not go into specific regulations for storage facilities. Ideally, Section 2[101] the ERB requires that an enterprise should be an entity involved in generation, transmission, distribution or supply of electricity.

2.6.3. Environmental Management Act

The principal regulation on environmental matters is the Environmental Management Act (EMA) No. 12 of 2011. The EMA establishes the Zambia Environmental Management Agency (ZEMA) as the principal regulator for the sector.

The EMA, as read together with Statutory Instrument No. 28 of 1997-The EIA Regulations, forbids any developer from implementing a project for which an Environmental Project Brief (EPB) or Environmental Impact Statement (EIS) is required unless the EPB or an EIA has been concluded and a Decision letter has been issued by ZEMA.[102]

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[95] Act No. 12 of 2019
[96] Section 4(a) of the Energy Regulations Act, No. 12 of 2019
[97] Section 4(0) of the Energy Regulations Act, No. 12 of 2019
[98] Section 10(a) of the Energy Regulations Act, No. 12 of 2019
[99] Section 4(v) of the Energy Regulations Act, No. 12 of 2019
[100] The Energy Regulation (General) Regulations, 2023
[101] ibid
[102] Section 3 (1) of Statutory Instrument No. 28 of 1997

CHAPTER 3

LEGAL AND REGULATORY FRAMEWORKS FOR BESS IN OTHER JURIDICTIONS

This chapter examines the legal and regulatory frameworks that govern Battery Energy Storage Systems (BESS) in selected jurisdictions across the world. The discussion focuses on four (4) key jurisdictions—South Africa, Kenya, the United Kingdom, and the United States of America—which have been selected based on their distinct legal traditions, policy approaches, and levels of technological development in the energy sector.

3.1. Introduction

The primary objective for this analysis is to identify how different countries have structured their laws, regulations, and institutional mechanisms to support the integration of energy storage technologies within their electricity systems. sectors. The selection of the countries is based on their distinct legal traditions, policy approaches, and levels of technological development in the energy sector.

By examining other jurisdictions, this chapter aims to draw lessons on the key legal, regulation policy, and institutional features that enable the effective deployment of BESS. The comparative insights derived will form a foundation for assessing the adequacy of Zambia's current legal and regulatory framework and identifying potential areas for reform to facilitate the integration of energy storage into its electricity sector.

3.2. Legal and Regulatory Frameworks for BESS in South Africa

a Overview

South Africa's energy sector bears notable similarities to Zambia in that both systems are deeply integrated into regional grid called the Southern African Power Pool (SAPP). Therefore, the technical requirements, grid-codes, interconnection agreements and cross-border trading arrangements associated with SAPP are broadly applicable in both jurisdictions. The interconnection between Zambia and South Africa implies that lessons drawn from the South African system may be especially relevant and translatable to Zambia.

b South African Legal System

South Africa has a mixed legal system comprising of a hybrid of Roman Dutch civilian law, English common law, customary law and religious personal law.[103]. For the

[103] University of Melbourne, 'South African Legal System'

energy sector regulatory regime, south Africa has a command-and-control regulatory approach with a central regulator appoint by an Act of parliament. The case of **AfriForum vs. Eskom/NERSA**[104] also demonstrates the court's jurisdiction over the electricity sector as it relates to safety and health safeguards protected by the constitution of South Africa.

c Legal and regulatory Regime for BESS

The basis for the regulatory regime for the electricity sector in South Africa is the **Electricity Regulation Act No. 4 of 2006**.[105] The Act establishes a national regulatory framework for the supply, generation, transmission, distribution, import/export and trading of electricity. The objects of the Act include the efficient, effective, sustainable and orderly development of electricity supply infrastructure; the safeguarding of present and future customers' interests; the promotion of diverse energy sources; and energy efficiency.

The South African Act is designed with a technology-neutral and system-oriented approach. For example, Section 1 of the Act defines generation as the production of electricity by any means.[106] This creates scope for newer technologies without constant statutory amendments. More recently, the regulatory framework in South Africa has undergone further reform to align with evolving technologies and the need for according increased flexibility through the adoption of **Electricity Regulation Amendment Act No. 38 of 2024**[107].

The purpose of the Act is towards electricity infrastructure as a whole and does not go into descriptive narrations of generation, transmission, distribution nor trading. Notable objects of the Act include[108] (1) the achievement of efficient, effective, sustainable and orderly development and operation of electricity supply infrastructure (2) ensure that the interests and needs of present and future electricity customers and end users are safeguarded and met, having regard to the governance, efficiency, effectiveness and long-term sustainability of the electricity supply industry within the broader context of economic energy regulation and (3) promote the use of diverse energy sources and energy efficiency. These provisions are not technology specific and take a broader perspective.

Despite **Section 8(1)** stating that no person may operate any generation, transmission or distribution facility, import or export any electricity or be involved in trading without a licence issued by the Regulator, the flexibility in the South African regulatory framework is emphasised under **Section 8(3)(a)** which requires that a potential

[104] [2024] ZAGPPHC 638
[105] Act No. 4 of 2006
[106] Ibid
[107] Electricity Regulation Amendment Act No. 38
[108] Section 2 of Electricity Regulation Act, No. 4 of 2006

licensee may not be precluded from discussing the contemplated operation of generation, transmission and distribution facilities, the import or export of electricity, trading, or any other activity relating thereto, prior to filing a licence application with the Regulator.[109] This provides room for potential licensees to engage the regulator and frame up an appropriate licensing mechanism that fits a particular undertaking.

The above position is further fortified under **Section 10(1)** which provides that the Minister may determine by notice in the Gazette that any person involved in an activity relating to trading or the generation, transmission or distribution of electricity that does not require licensing using the established frameworks must register with the Regulator.[110] This ensures all activities in the electricity value chain are accommodated.

d Conclusion

While the Electricity Regulation Act of South Africa does not make explicit and detailed reference to Battery Energy Storage Systems (BESS), its broad and technology-neutral provisions create sufficient legal space for their inclusion within the national electricity framework. The Act and its amendment empowers the Minister in charge of electricity to issue regulations, determinations, and policy directives relating to any aspect of electricity infrastructure, including emerging technologies. This level of flexibility enables the South African government to introduce regulatory measures without requiring statutory amendment. In this way, the legal framework remains adaptive to innovation and evolving energy market dynamics.

While the current legal framework in South Africa is sufficiently flexible to accommodate innovation through ministerial regulations and policy directives, the absence of direct statutory reference to these technologies may, over time, create regulatory uncertainty. Therefore, incorporating clear definitions, licensing provisions, and operational guidelines for energy storage within future legislative amendments would enhance legal clarity, investor confidence, and effective integration of advanced energy technologies into the electricity supply industry.

3.3. Legal and Regulatory Frameworks for BESS in Kenya

a Kenyan Legal System

Like Zambia, Kenya's legal system has its historical roots in the British common law tradition, having been inherited through colonial influence. Over time, Kenya has developed a hybrid legal framework that blends common law principles with statutory enactments and customary law, thereby creating a system that recognizes both formal

[109] Act No. 4 of 2006
[110] Section 10(1) Electricity Regulation Act, No. 4 of 2006

legislative instruments and traditional legal norms. Within this context, the regulation of the energy sector, including electricity, falls under a modern statutory regime designed to reflect international best practices while addressing national development priorities[111].

Within the energy sector, Kenya also has a command-and-control regulatory approach with a central regulator appoint by an Act of parliament. Landmark case of **Save Lamu et al. v. National Environmental Management Authority and Amu Power Co. Ltd**[112] show cases the jurisdiction of the Kenyan courts on the electricity sector as it relates to comprehensive environmental and social impact assessments and public disclosure during the construction of electricity infrastructure.

b Legal and regulatory Regime for BESS

The overarching purpose for the Kenyan **Energy Act, No. 1 of 2019** is to provide for the regulation, production, conversion, transmission, distribution, supply, and use of energy and energy resources, including electricity, petroleum, renewable energy, and other emerging energy forms.

The Act establishes the Energy and Petroleum Regulatory Authority (EPRA) as the central regulatory body responsible for overseeing licensing, tariff approval, compliance enforcement, and the promotion of sustainable energy development. EPRA is established under Part II of the Energy Act, succeeding the former Energy Regulatory Commission (ERC).

Under **Section 10** of the Energy Act,[113] EPRA's mandate covers a broad range of regulatory and developmental functions in the energy sector[114] including:

i Regulating the generation, importation, exportation, transmission, distribution, and supply of electrical energy, as well as the exploration and production of other energy forms;
ii Issuing, renewing, and revoking licences for energy undertakings, including renewable energy and hybrid systems incorporating energy storage;
iii Approving and enforcing tariffs, pricing mechanisms, and market rules to promote cost-reflective yet affordable energy pricing;
iv Formulating and enforcing technical and environmental standards for the safe and efficient operation of energy infrastructure;
v Monitoring compliance with licence conditions, grid codes, and operational guidelines; and

[111] Energy Act, No. 1 of 2019
[112] Tribunal Appeal No. Net 196 of 2016
[113] Act No. 1 of 2019
[114] Ibid

vi Promoting competition, innovation, and sustainable energy development across all energy value chains.

Section 2 of the Energy Act[115] defines electrical energy as the energy involving the use of electric current which may be produced either by mechanical, chemical, photovoltaic or any other means.[116] In terms of generation, the Act defines the word generate such as to mean the production of electricity from any station for generating electricity, including any buildings and plant used for the purpose, and the site thereof, but does not include any station for transforming (other than generator transformers), converting or distributing electrical energy generating station, for the purpose of giving supply to any premises or enabling a supply to be so given.[117] The Act does however include the term storage in the definition of the word undertaking albeit in the context of other forms of energy.

In **Section 200(1)** the Energy Act mandates the regulatory authority to adoption and implement measures to conserve energy and improve efficiency in harnessing, processing, and conversion, transportation, storage of energy, cogeneration, and heat recovery and in the use of energy in all consumer sectors. In this undertaking, the regulatory authority is expected to identify the available technologies and facilitate deployment of such technologies for improving efficiency in the harnessing of energy, processing, conversion, transportation, storage and use of energy.[118] The Kenyan Energy Act seems to recognise the advent of energy storage however it does not make explicit regulatory measures for the technology.

Like in previous jurisdictions, the Kenyan regulatory framework requires that a person who wishes to carry out the generation, exportation, importation, transmission, distribution and retail supply of electricity must apply for a licence as the case may be to the Authority in accordance with the provisions of the Energy Act.[119]

The Kenyan Regulatory framework is expected to be modified in view of the National Energy Policy 2025-2034 which prioritises renewable energy and sets the framework for integrating new technologies, including BESS, into Kenya's energy sector.[120] In July 2025, the Kenyan generation utility company, KenGen, launched its first batter energy storage system to power its modular data centre.[121]

[115] No. 1 of 2019
[116] Ibid
[117] Section 2 of the Energy Act, No. 1 of 2019
[118] Section 200(2)(e) of the Energy Act, No. 1 of 2019
[119] Act No. 1 of 2019
[120] Government of Kenya, 'National Energy Policy 2025 – 2034
[121] KenGen, 'KenGen Unveils its First Battery Storage System to Power Data Center'

c Conclusion

Kenya's regulatory landscape has transitioned into pivotal phase marked by both policy foresight and technological advancement. The forthcoming National Energy Policy 2025–2034 is expected to provide a strategic blueprint for integrating renewable energy and modern grid technologies, including Battery Energy Storage Systems (BESS), into the national energy mix. This policy marks a shift from traditional regulatory structures towards a more dynamic and adaptive framework capable of accommodating innovation and addressing emerging challenges such as intermittency, grid flexibility, and energy access.[122]

The policy's emphasis on the integration of energy storage, smart grids, and digitalisation demonstrates Kenya's recognition that a sustainable and resilient electricity system depends not only on expanding generation capacity but also on enhancing system reliability and energy efficiency. By establishing clear policy intent, the National Energy Policy 2025–2034 is expected to guide the revision of existing regulatory instruments under the Energy Act, No. 1 of 2019, empowering institutions such as the Energy and Petroleum Regulatory Authority (EPRA) to formulate targeted guidelines and licensing mechanisms for energy storage facilities. This evolution will provide legal certainty and encourage private investment in the development of grid-scale and distributed storage projects.

3.4. Legal and Regulatory Frameworks for BESS in England

a Legal System in England

The English legal system is a common law system founded on statutes and precedent. Acts of Parliament and case law are the main sources of law, and courts use the stare decisis (precedent) concept to guarantee uniformity.

For the electricity sector, England equally applies the command and control approach with traces of incentive based and market control regulation. Decided cases such **Commission v Tempus Energy and Tempus Energy Technology**[123] demonstrates the authority of the courts over commercial matters regarding the establishment of an electricity capacity markets and its compatible with the EU rules on State aid.

The legal system of England and Wales has, to a significant extent, shaped the evolution of legal frameworks across many Commonwealth jurisdictions, including Zambia, South Africa, and Kenya. Rooted in the English common law tradition, these systems have inherited fundamental principles such as the doctrine of precedent,

[122] Government of Kenya, 'National Energy Policy 2025 – 2034

[123] Case C- 57/19

statutory interpretation, and judicial oversight in the development of regulatory governance. Accordingly, a study of the United Kingdom's regulatory approach to Battery Energy Storage Systems (BESS) provides valuable insights into how a mature and innovation-driven jurisdiction has structured its legal instruments to accommodate emerging energy technologies within an evolving electricity market.

b Legal and regulatory Regime for BESS

The principal legal framework for electricity in England is contained in the **Electricity Act 1989, Chapter 29** and the **Energy Act, 2023 Chapter 52**[124] **of the Laws of England**. These instruments complemented by secondary legislation such as the **Electricity (Class Exemptions from the Requirement for a Licence) Order 2001**, provides the statutory foundation for generation, transmission, distribution, and supply of electricity.

Oversight of these activities lies primarily with the Office of Gas and Electricity Markets (Ofgem), an independent regulator responsible for promoting competition, ensuring fair pricing, protecting consumers, and facilitating decarbonisation through regulatory innovation[125].

Under the **Electricity Act 1989**, it is an offence for any person to engage in electricity-related activities without proper authorisation. Specifically, any person who generates, transmits, distributes, or supplies electricity, coordinates its flow over the transmission network, operates an interconnector, provides smart meter communication services, or manages a designated electricity license document must hold a license issued by the regulatory authority. Non-compliance constitutes an offence, punishable by fines on summary conviction or indictment. These provisions collectively establish the baseline regulatory obligations for all participants in the electricity value chain.

Significantly, the **Energy Act 2023** introduced crucial amendments to this framework, particularly in **Section 3ZA**, which expressly extends the definition of electricity generation to include the generation of electricity from stored energy. The amendment clarifies that stored energy refers to energy converted from electricity and held for subsequent reconversion into electricity. This definition explicitly recognizes battery energy storage systems as part of the generation process, thereby bringing BESS operators under the same licensing and regulatory requirements applicable to conventional generators.

In addition, **Section 3A** expands the concept of participation in transmission to include any person who makes available, for the purposes of a transmission system, any infrastructure forming part of it. This ensures that entities involved in the physical or

[124] Energy Act, 2023
[125] Ibid

operational integration of storage assets into the grid are duly captured within the licensing framework. Together, these provisions create a comprehensive legal basis for the regulation of BESS within the United Kingdom, marking one of the clearest statutory recognitions of energy storage among common-law jurisdictions.

Further, **Section 36(1) of the 1989 Act**[126] stipulates that no generating station may be constructed, extended, or operated at a relevant site without consent from the appropriate authority. Violation of this requirement constitutes an offence, attracting a fine not exceeding Level 5 on the standard scale. However, **Section 36(2)** introduces a degree of flexibility by allowing exemptions for specific categories of generating stations, while **Section 36(4)** empowers the Secretary of State to issue orders exempting particular classes of generating facilities from consent requirements. **Section 111(2)** reinforces this flexibility by allowing regulatory orders to be framed with reference to any matters or circumstances deemed relevant, thereby enabling adaptive regulation as technology evolves[127].

In exercise of these powers, the **Electricity Storage Facilities (Exemption) (England and Wales) Order 2020** was enacted under **Sections 36(2)**, **36(4)**, and **111(2)**. This Order exempts certain electricity storage installations, other than those situated in Wales or Welsh waters, from the need to obtain separate generating station consent.[128] This regulatory innovation effectively recognizes the dual operational nature of storage systems, which both consume and produce electricity, and ensures that they are treated as a distinct class of energy infrastructure rather than as traditional generation assets.

The United Kingdom's approach therefore provides a clear statutory framework for integrating storage technologies within the electricity market. Compared to Zambia, South Africa, and Kenya, where storage remains largely unclassified or indirectly referenced, the English framework offers explicit legal certainty, streamlined licensing processes, and tailored exemptions that encourage private sector investment. The progressive adaptation of long-standing statutes such as the **Electricity Act**[129] demonstrates how legacy legislation can evolve to accommodate technological transformation while maintaining regulatory coherence.[130]

3.5. Legal and Regulatory Frameworks for BESS in United States

a Legal System in the United States of America

The legal system in the United States of America is based on the common law tradition, relying heavily on judicial precedents. In the U.S., even where a statute is at issue, prior judicial determinations play a crucial role in resolving matters before the courts.[131]

[126] Electricity Act, 1989 of the laws of England
[127] Ibid
[128] Ibid
[129] Ibid
[130] Ibid
[131] FERC Order 51

b Legal and regulatory Regime for BESS

The regulation of commercial activities in the United States draws on the English common law concept of "property clothed with a public interest," found in the writings of Sir Matthew Hale.[132] A business is considered clothed with a public interest when it operates in a manner that makes it of public consequence and affects the community at large[133]. When a business is "clothed with a public interest," the owner effectively grants the public an interest in that use and must submit to public control for the common good, to the extent of that use.[134] In the matter of **Nebbia v. New York,**[135] it was concluded that most modern business enterprises may be considered sufficiently "clothed with a public interest" to justify regulation under the American Federal Constitution.

Statutory regulation is rooted in the broader constitutional framework of **Article I**, **Section 8**,[136] which empowers Congress to regulate commerce with foreign nations, among the several states, and with Indian tribes. This provision grants the federal government broad authority to regulate activities that affect interstate commerce.

There is no single statutory provision that serves as the principal regulatory framework for electricity in the United States. Instead, different components of the electricity value chain are governed by distinct statutes and regulatory mechanisms. The Federal Power Act focuses on the management of watercourses and the development of hydroelectric power projects, while the Energy Policy Act promotes secure, affordable, and reliable energy to support sustainable economic growth. The Public Utility Regulatory Policies Act of 1978 (PURPA) encourages energy conservation, increased use of renewable and domestic energy resources, and competition within the electricity sector. PURPA also extends to storage devices, classifying them under "load management techniques."

Two principal institutions oversee the regulation of the electricity markets and the reliability of the bulk power system in the United States: the Federal Energy Regulatory Commission (FERC) and the North American Electric Reliability Corporation (NERC). FERC is a federal agency established under the Department of Energy Organization Act of 1977 to regulate electric transmission and wholesale sales rates and services, principally under Parts II and III of the Federal Power Act. It issues regulatory orders governing the operation and regulation of electricity undertakings.

FERC Order No. 841, issued in February 2018, directed Regional Transmission Organizations (RTOs) and Independent System Operators (ISOs) to establish market rules that remove barriers to the participation of electric storage resources (ESRs) in wholesale power markets. The order mandates that storage resources be allowed to provide all energy, capacity, and ancillary services they are technically capable of delivering, thereby improving market efficiency and ensuring fair compensation. FERC defines energy storage as a resource capable of receiving electric energy from the grid and storing it for later reinjection into the grid. This means that battery energy

[132] Lexis Nexis, 'Intro to American legal system'
[133] 94 U.S. 113, 125 (1877)
[134] Ibid
[135] 291 U.S. 502 (1943)
[136] Constitution of the United States of America

storage systems (BESS) can be regulated across multiple layers of the electricity value chain.

However, a key challenge arises from the division of regulatory jurisdiction between the federal government and the states. While FERC maintains authority over activities involving the transmission and wholesale sale of electricity in interstate commerce, generation and distribution activities fall primarily under state jurisdiction. Thus, FERC regulates battery storage when it involves interstate transmission, wholesale sales, or energy arbitrage (sales for resale), whereas states regulate battery storage when it is considered a generation resource. In some cases, FERC has asserted jurisdiction over distribution-level storage when such resources participate in wholesale or retail electricity markets.

This jurisdictional complexity was highlighted in the case involving the Public Utility Commission of Texas (PUCT). The PUCT considered a battery installation as a transmission asset for the portion providing reactive power (voltage control), but classified its backup power services as a distribution asset. The Commission reasoned that, although batteries can discharge real power, they primarily provide reliability services rather than continuous power generation. By storing electricity and time-shifting generation, battery storage offers an additional grid benefit beyond traditional generation. The failure to recognize and adequately compensate these services limits potential revenue streams for storage developers and investors, thereby constraining investment in this emerging technology.

3.6. Conclusions

The regulation of Battery Energy Storage Systems (BESS) has emerged as a critical element in the global transition towards cleaner, more flexible, and resilient energy systems. Across jurisdictions, the effectiveness of storage deployment is shaped largely by the legal and institutional frameworks that govern the electricity sector, particularly the extent to which such frameworks recognize storage as an independent activity within the energy value chain.

The evolution of legal and regulatory frameworks across the United Kingdom, Kenya, and South Africa illustrates that energy storage regulation is not merely a technical challenge but a governance imperative. As these countries continue to modernize their electricity systems, the formal recognition and valuation of BESS within regulatory and market frameworks will be crucial to achieving grid stability, renewable energy integration, and long-term energy security. The comparative analysis further underscores the importance of clear statutory definitions, harmonized market access rules, and enabling policy environments—all of which collectively determine the pace and scale at which energy storage technologies can transform national power systems.

These regulations and definitions will likely depart from the traditional form of classification and valuation due to the flexibility of battery storage. Inadequate regulations and policies can lead to battery storage systems not receiving adequate compensation for the vast services they supply, thus deterring significant investment opportunities that were available to renewable energy resources. Utilities are required to provide uninterrupted supply to their customers including the use of energy storage devices.

CHAPTER 4

GAPS IN ZAMBIA'S LEGAL AND REGULATORY FRAMEWORK FOR BESS

This chapter is comparative analysis of the regulatory frameworks in Zambia and the jurisdiction discussed above.

4.1. Gaps in the Legal and Regulatory Framework

4.1.1. Lack of Dedicated Legal Framework for BESS in Zambia

The regulatory authority for the United States of America is strongly rooted in businesses clothed with public interest. These businesses are required to be regulated the owner effectively grants the public an interest in that use and must submit to public control for the common good, to the extent of that use. Battery energy storage systems operate in the realm of a public good as electricity is consumed by the public indiscriminately. Decisive steps are thus required to ensure the public interest is upheld through certain forms of regulation.

Available literature seems to suggest that Zambia has no specific legislative instrument addressing energy storage technologies. While policies such as the **National Energy Policy (2019)**, the **Electricity Act No. 11 of 2019**, and the **Energy Regulation Act No. 12 of 2019** provide general guidance for renewable energy integration and market liberalisation[137], none explicitly and clearly recognise or regulate BESS as a standalone energy asset.[138] The regulatory landscape itself is characterised by policy uncertainty, overlapping institutional mandates, and inadequate secondary legislation to operationalize key provisions of the Electricity Act No. 11 of 2019 and the Energy Regulation Act No. 12 of 2019.

The omission of a regulatory framework for BESS leads to vagueness in authorising, licensing, ownership, and participation rights of storage operators within the electricity market, making it difficult for a pragmatic investor to have confidence in capitalising and providing financing for such undertakings. The legal ambiguity translates into

[137] GRZ, National Energy Policy (2019)
[138] Act No. 12 of 2019

heightened investment risk, as financiers and independent power producers (IPPs) struggle to ascertain the scope of their rights and obligations in relation to project licensing, tariff approval, grid access, and long-term power purchase arrangements (PPAs). The lack of a clear-cut framework is a red flag to potential investors as to the risks associated with the technology. In England for example, the approach is to provide a clear and certain statutory framework for the market. The law is certain as to whether an activity is regulated or falls within the exemptions provided by law.

Another factor of consideration in the Zambian case is that the energy sector continues to exhibit an appreciable level of regulatory discretion. The approval of tariffs and negotiation of key industry documents in the electricity industry among the industry players, and between Government and industry players is largely on a case-by-case basis. The so-called Multi-Year Tariff Adjustment Mechanism provided for under **Section 34 of the Electricity Act**[139] is yet to be fully operationalised.

Discretionary practices by a regulator create perceptions of regulatory instability and undermine investor confidence, especially for long-term infrastructure investments that require predictable revenue streams. The ERB has recognised this loss of confidence in the regulator as one of the elements of regulatory capture.[140] Jurisdictions such as South Africa and Kenya have established more structured regulatory environments anchored in clear legislative instruments, standardised licensing procedures, and well-defined market rules that enhance investor confidence by minimising legal and commercial risks.

In essence, the absence of a comprehensive legal and regulatory framework in Zambia's electricity sector not only delays the integration of innovative technologies like BESS but also limits the country's ability to attract sustainable private capital. For Zambia to position itself as a competitive investment destination in the regional energy market, it is imperative to develop explicit legal provisions, transparent regulatory mechanisms, and standardized contractual frameworks that reduce uncertainty and balance the interests of investors, consumers, and the state.

[139] No. 11 of 2019
[140] ERB, 'ERB Integrity Committee' https://www.erb.org.zm/ic

4.1.2. Regulatory Ambiguity on Licensing and Market Participation

The **Energy Regulation Board (ERB)**[141] currently licenses generation, transmission, and distribution activities under the Electricity Act. However, there is **no defined category or process** for licensing BESS projects. This makes it difficult for Independent Power Producers (IPPs) or private investors to participate in storage ventures unless bundled with generation assets.

Currently, there is no specific license that can be issued by the ERB nor any other Government agency that can support or regulate a facility primarily based on energy storage. Such a facility will thus be regulated through two licenses that may run concurrently one being through a power supply agreement at which point the BESS itself becomes a consumer and buys power from the grid and the other being a generation license in which the BESS is treated as a power producer. At this point the BESS is both a consumer and a generator and the only benefit the asset owner enjoys is that of energy arbitrage.

Lessons can be drawn from the South Africa framework where the Minister responsible for electricity has flexibility to consult with a would-be licensee or regulatee and thereafter issue out an instrument to introduce a license that fits a new technology or undertaking not envisaged by existing law. This would require amendment of the Electricity Act to give such power to the Minister to issue out statutory instruments for new licence types.

4.1.3. Licensing and Regulatory Classification of Energy Storage

The Energy Regulation Board (ERB) serves as Zambia's principal energy regulator and derives its mandate from the Energy Regulation Act No. 12 of 2019. According to Section 4(2) of the Act, the ERB is empowered to regulate the generation, transmission, distribution, and supply of electricity, as well as to issue licenses and monitor compliance across the energy value chain. Complementing this is the

[141] Act No. 12 of 2019

Electricity Act No. 11 of 2019, which provides the overarching framework governing the licensing, operation, and performance of electricity undertakings in the country.[142]

Despite these legislative instruments, the current Zambian legal and regulatory framework does not explicitly recognise Battery Energy Storage Systems (BESS) as a distinct category within the energy supply chain. Under Sections 7 and 8 of the Electricity Act, licenses may be issued only for generation, transmission, distribution, supply, and system operation. The omission of energy storage from this list reflects the absence of a defined regulatory classification for BESS, resulting in uncertainty as to how such projects should be treated under existing licensing regimes.

The ERB currently lacks a dedicated licensing process or tariff mechanism for storage-based assets. Consequently, Independent Power Producers (IPPs) and private sector actors can only engage in BESS deployment when it is bundled with generation assets, such as solar photovoltaic (PV) or hybrid renewable energy power plants. This approach limits the potential of BESS to operate as a standalone asset.

Furthermore, the lack of legal recognition for energy storage complicates key regulatory issues, including tariff determination, grid interconnection rights, and market participation. Without explicit provisions that codifies the dual nature of battery energy storage, the ERB's current instruments remain inadequate to accommodate the unique operational dynamics of BESS. This regulatory gap also affects planning and investment certainty, as developers face difficulties securing commercial documents to ensure bankability of the projects.

4.1.4. Tariff Determination and Market Access for BESS

The absence of a dedicated regulatory framework for BESS in Zambia extends beyond licensing to the domain of tariff determination and market access. Under the current Electricity Act No. 11 of 2019, tariffs are primarily structured for generation, transmission, and distribution activities, with rates set by the ERB based on cost-reflective methodologies, operational efficiency, and projected investment recovery.

[142] Ibid

However, these provisions do not explicitly address the commercial valuation of storage services, such as energy shifting, frequency regulation, or ancillary support.

As a result, developers seeking to invest in standalone BESS projects face uncertainty regarding remuneration. Unlike conventional generation, storage does not produce energy per se, but rather provides grid services by storing electricity when supply exceeds demand and releasing it during peak periods. Storage also provides system support services such as voltage and frequency support which in advanced societies have already been commercialised. The absence of clearly defined pricing mechanisms or contractual frameworks for these services complicates negotiations as to the adequacy of the compensation that is due to investors in BESS assets.

Additionally, market access for storage operators remains constrained. Existing grid codes and licensing regulations primarily accommodate generation-based IPPs, while ancillary service markets or capacity payments for storage are not yet institutionalised. This structural gap restricts BESS from contributing fully to grid flexibility, peak load management, and renewable integration, thereby limiting the operational and financial incentives for storage deployment.

The challenge of market integration is compounded by the dominance of ZESCO, a vertically integrated national utility which is the principal off-taker and system operator. While ZESCO's centralized role enables coordinated system planning, it also creates barriers for IPPs and storage developers seeking direct market participation. ZESCO is seen to have a considerable influence on the Energy Regulation Board resulting in regulatory schemes tailored around the interests of ZESCO. The case of the People v Attorney General and Energy Regulation Board is a clear example where regulatory authority has been used to favour the interest of preferential market players.

Without specific mechanisms for BESS to monetise flexibility services or enter capacity markets, storage investment remains contingent on hybrid arrangements bundled with generation projects; more particularly, solar PV installations.

4.1.5. Regulatory Gaps in Grid Codes and Interconnection Standards for BESS

The integration of BESS into Zambia's electricity grid is further complicated by gaps in grid codes and interconnection standards. The Zambian Grid Code, enforced by the ERB, provides technical requirements for connection, operation, and dispatch of generation units. While the grid code addresses voltage regulation, frequency control, and safety for conventional generation, it does not explicitly define technical standards for energy storage systems.[143] For BESS, operational issues such as control and dispatch protocols, voltage and frequency response requirements, protection and safety standards for bidirectional power flows, data reporting and telemetry requirements tailored are not provided for under the grid codes[144]. BESS possess unique operational characteristics that distinguish them from traditional generation assets. Unlike conventional generators, storage units can both inject and absorb electricity, respond rapidly to frequency deviations, and provide ancillary services such as voltage support and capacity reserves.

The absence of such provisions creates interconnection uncertainties for developers of standalone storage projects. Utilities and system operators may hesitate to permit grid connections without clear standards, leading to delays, additional technical assessments, and increased project costs. This also limits the ability of BESS to contribute to grid stability, peak shaving, and renewable integration, which are critical for Zambia's evolving electricity market.

Further, the lack of standardised interconnection procedures creates a vacuum as to allocation of risks and obligations at the point of connection. Developers must rely on case-by-case negotiations with ZESCO or adapt their systems to meet general generation standards, which may not fully accommodate the operational flexibility of storage. This increases transactional risks and may deter investment in storage-only projects.

Comparatively, jurisdictions such as South Africa and the United States have developed grid codes and interconnection standards that explicitly incorporate energy

[143] Statutory Instrument No. 79 of 2013
[144] Energy Regulation Board (ERB), Licensing Guidelines (2020)

storage. These include detailed technical requirements, performance testing protocols, and operational guidelines that enable storage to provide grid services while maintaining system reliability. Zambia's absence of such provisions represents a critical regulatory gap that undermines the country's ability to leverage storage technologies for grid modernization and renewable integration.

In the United States of America, apart from the regulator, industry institutions such as the NERC and NFPA are instrumental in shaping the legal framework as they provide expert knowledge on operational system requirements and safety standards that are assimilated into the legal and regulatory framework. Zambia has industry institutions such the Engineering Institution of Zamia (EIZ), Law Association of Zambia (LAZ), Economic Association of Zambia (EAZ), Association of Power Companies (APC), Solar Association of Zambia (SAZ) and academia whose inputs towards the sharping of a future power system premised on sound legal and economic principles is yet to appreciate.

4.2. Mitigation from Other Jurisdictions

The analysis of Zambia's legal and regulatory framework demonstrates that while the Electricity Act No. 11 of 2019 and Energy Regulation Act No. 12 of 2019 provide a solid foundation for energy governance, they are insufficient to accommodate the unique characteristics of Battery Energy Storage Systems. Regulatory gaps exist in three critical areas namely (1) licensing and classification, (2) tariff determination and market access, and (3) grid code and interconnection standards.

Unlike jurisdictions such as South Africa, Kenya, and the United States, which have introduced dedicated regulatory pathways, tariff structures, and technical standards for storage, Zambia currently relies on hybrid arrangements and case-by-case interpretations. This creates uncertainty for Independent Power Producers (IPPs) and private investors, limits the deployment of standalone storage projects, and constrains the potential of BESS to enhance grid flexibility and renewable energy integration.

An assessment of international market and their experiences reveals that several jurisdictions have undertaken deliberate legal and regulatory reforms to facilitate the integration of Battery Energy Storage Systems (BESS) within their electricity markets. These mitigation measures offer practical insights for Zambia, particularly in addressing regulatory uncertainty, clarifying asset classification, and establishing investment incentives for storage technologies.

In South Africa has gradually assimilated BESS within its national energy development tools. The Integrated Resource Plan for South Africa explicitly recognizes energy storage as a critical component for enhancing grid reliability and supporting renewable energy integration. Under this framework, storage is identified as a grid-supporting asset, enabling it to be formally considered in generation expansion planning and system operations. Complementing this, South Africa has revised its Grid Connection Codes to incorporate technical and operational standards specific to energy storage facilities. These codes outline the requirements for connection, performance, and safety compliance, providing much-needed regulatory clarity for both public and private developers.

By embedding storage in both the IRP and grid codes, South Africa has effectively reduced regulatory ambiguity and signalled long-term policy support for storage investment. This approach also encourages independent power producers (IPPs) to consider hybrid generation models such as solar-plus-storage projects within the competitive procurement framework.

In Kenya, regulatory evolution is taking shape through the Energy and Petroleum Regulatory Authority (EPRA), which is in the process of amending the Energy (Electricity Licensing) Regulations, 2012 to explicitly include energy storage within the renewable energy portfolio. This policy shift is informed by empirical lessons derived from pilot projects implemented under the Kenya Electricity Modernisation Project (KEMP). These pilots demonstrated the role of BESS in stabilizing voltage fluctuations, improving rural electrification reliability, and supporting mini-grid operations. By legally recognizing storage as an integral component of the renewable energy ecosystem, Kenya aims to bridge the current policy vacuum surrounding hybrid and off-grid systems. Once enacted, the new licensing framework will provide regulatory certainty regarding ownership models, tariff setting, and grid interconnection standards, key issues that have historically discouraged private sector participation. Kenya’s gradual but deliberate reform trajectory highlights the importance of integrating pilot-based learning into national regulatory instruments.

The United States represents one of the most advanced and mature regulatory environments for energy storage. The country's approach is characterised by a combination of federal and state-level interventions designed to promote storage deployment as part of a broader decarbonization strategy. At the subnational level, California has been particularly proactive through the enactment of Assembly Bill 2514 (AB 2514), which mandates investor-owned utilities to procure specified quantities of energy storage capacity. This statutory obligation effectively transforms storage from an experimental technology into a recognized grid and generation asset.

The legal framework further encourages utilities to develop procurement plans approved by the California Public Utilities Commission (CPUC), ensuring transparency and accountability in implementation. At the federal level, the Federal Energy Regulatory Commission (FERC) has issued landmark directives such as Order No. 841, which requires independent system operators (ISOs) and regional transmission organizations (RTOs) to revise their market rules to accommodate energy storage participation. Through this order, storage resources are allowed to compete on equal terms with conventional generation in capacity, energy, and ancillary service markets. This dual federal–state approach has fostered a coherent policy environment that recognizes BESS as both a generation and a grid service asset, creating a model for how regulatory innovation can unlock large-scale private investment in storage infrastructure.

In summary, these jurisdictions demonstrate that legal and regulatory certainty is the cornerstone for successful BESS integration. South Africa's policy alignment, Kenya's regulatory modernization, and the United States' market-based incentives collectively illustrate that clearly defined rules governing classification, grid access, and market participation can significantly reduce investment risk. Zambia, therefore, can draw valuable lessons from these experiences to design a tailored regulatory framework that supports energy transition goals while ensuring investor confidence and grid resilience.

To address these gaps, Zambia may consider adopting regulatory innovations observed in other jurisdictions, such as:

- i Establishing separate tariff categories for energy storage services, including capacity, energy arbitrage, and ancillary support
- ii Introducing market rules for storage participation in ancillary service markets, thereby allowing independent storage operators to sell flexibility and reliability services.
- iii Developing standardized contractual frameworks for storage-only PPAs to reduce negotiation complexity and increase investment certainty;
- iv Harvest the expert knowledge from industry players to ensure cognisance is made of industry requirements as the legal and regulatory frameworks are being developed.
- v Strengthening of the Energy Regulation Board and protect the institution from regulatory capture.

4.3. Conclusion

The above analysis establishes that while Zambia's Energy Regulation Board (ERB) currently licenses activities such as generation, transmission, and distribution under the Electricity Act No. 11 of 2019, there is no specific legal category or licensing mechanism for standalone energy storage facilities. Consequently, potential investors and Independent Power Producers (IPPs) can only participate in storage projects when such systems are bundled with generation or distribution assets. This regulatory omission creates uncertainty for private sector participation, limits innovation, and slows the adoption of modern grid-supporting technologies.

Furthermore, the study has revealed that Zambia's current policy instruments—such as the National Energy Policy (2019) and the Electricity (Licensing) Regulations—do not explicitly recognize energy storage as a distinct asset class within the power value chain. This absence of recognition hinders the country's ability to integrate renewable energy efficiently, manage intermittency, and enhance grid reliability. The lack of clear technical and operational standards for storage facilities also presents safety and performance risks, as there are no national codes defining connection requirements, performance criteria, or operational obligations for BESS installations.

Comparative experiences from other jurisdictions underscore the importance of targeted regulatory reforms. Based on lessons from selected jurisdictions, it has become evident that Zambia's regulatory environment requires reform to accommodate the emerging role of energy storage in its energy transition. Establishing a specific licensing framework for BESS, integrating storage into national planning instruments, and developing technical and operational standards for grid connection and safety compliance would provide the regulatory clarity necessary to attract investment and promote sustainable energy innovation.

CHAPTER 5

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

This chapter blends together the main arguments presented in this study and draws conclusions concerning the topic. The chapter revisits the fundamental research objectives and reflects on how the findings respond to the central research problem. The chapter finally proposes actionable recommendations aimed at reforming the existing legal frameworks to enable the effective adoption of energy storage technologies in Zambia. These recommendations are framed within Zambia's broader goals of enhancing energy security, diversifying the generation mix, increasing renewable energy penetration, and strengthening climate resilience.

5.1. Summary of Key Findings

Zambia's electricity generation environment is predominantly reliant on hydropower. While historically reliable, hydropower has increasingly become vulnerable to prolonged droughts and fluctuating rainfall patterns attributed to climate change. This vulnerability has exposed the fragility of the country's energy supply and reinforced the need for complementary energy technologies capable of stabilizing the grid and enabling efficient integration of renewable energy sources such as solar and wind.

BESS has emerged globally as a strategic response to such challenges and is expected to be critical factor in the transition from conventional power generation assets to renewable energy sources. BESS comes with specific advantages to the national grid which include energy shifting, frequency regulation and general ancillary support.

This study has, however, established that several legal and regulatory gaps exist that are likely to impede the deployment of energy storage technologies in Zambia. Despite the technology being mature and proven, commercial arrangements which are predominantly reliant on legal systems tend to show a hazy picture for of regulatory risk and policy inconsistency. Some of the gaps identified include:

a) Lack of a Defined Legal Status for Energy Storage

The study found that Zambia's Electricity Act No. 11 0f 2019 and associated subsidiary legislation do not explicitly recognise energy storage as a separate activity within the electricity supply industry. This omission results in vagueness and ambiguity regarding whether BESS should be regulated as generation, transmission, distribution, or a service ancillary to grid operations. The absence of a defined legal identity for storage leads to significant uncertainty for both regulators and investors.

b) Ambiguity in Licensing Structures and Institutional Roles

Since storage systems has not been clearly classified, there is no licensing framework tailored to the establishment of standalone BESS facilities. Investors, particularly Independent Power Producers (IPPs), lack procedural guidance on how to obtain regulatory approval for storage projects. This uncertainty increases transaction costs and discourages private sector participation. Investor confidence remains low because of the absence of clear regulatory and legal frameworks increases the perceived risk associated with investing in energy storage projects whose regulatory regime is yet to be ascertained.

c) Absence of Tariff and Market Compensation Frameworks

The study reveals that there is no existing tariff and market compensation structure that recognises the value-added services provided by Battery Energy Storage Systems. This gap is particularly significant given that Zambia is already experiencing periods of prolonged power deficits, where the ability of the system to balance supply and demand is strained.

In such a context, storage could play a stabilizing role by enhancing system dependability and supporting renewable integration. However, without clearly defined revenue mechanisms, investors are unable to recover costs or generate predictable returns. This uncertainty increases investment risk and further weakens investor confidence, thereby slowing the adoption of technologies that could help address existing supply challenges in the energy sector.

d) Limited Technical Standards and Integration Guidelines

The research further established that Zambia does not have grid codes or national technical standards specifically tailored to BESS deployment. This gap complicates engineering design, operational compliance, and safety assurance. It also increases reliance on external consultants and lengthy review and approval process raising the overall project development costs.

5.2. Lessons from Comparative Jurisdictions

Comparative assessment with South Africa, Kenya, and the United States revealed that jurisdictions that have successfully deployed storage have done so by explicitly defining storage in law, creating dedicated licensing pathways, establishing market and tariff incentives, and issuing technical and safety standards. These measures have resulted in increased investor confidence, accelerated technology uptake, and improved grid resilience. The jurisdictions that have successfully integrated BESS into their power systems have done so by instituting supportive tariff and market mechanisms anchored in law. For example, **South Africa**, through the **National Energy Regulator Act, 2004** and accompanying regulatory determinations, has embedded energy storage within the Integrated Resource Plan (IRP 2019), allowing for cost recovery through regulated tariffs for grid services. Likewise, the **South African Grid Code** has been updated to accommodate storage, thereby creating certainty for both system operators and investors.

In **Kenya**, the **Energy Act, 2019** explicitly recognizes new and emerging technologies, including energy storage, within the electricity supply industry. This legislative recognition has enabled the Energy and Petroleum Regulatory Authority (EPRA) to develop tariff guidelines and pilot procurement models that support hybrid renewable-plus-storage projects, particularly in regions prioritized for mini-grid electrification. By providing a clear legal basis for participation, Kenya has stimulated investor confidence and encouraged the expansion of storage-enabled renewable systems.
In the similar manner **United States**' recognition of energy storage as a market participant was strengthened through **Federal Energy Regulatory Commission**

(FERC) Order No. 841 (2018), which requires wholesale electricity markets to establish compensation structures that allow storage to be paid for the full range of grid services it provides. This policy intervention has been credited with accelerating storage deployment, lowering system costs, and enhancing grid reliability across several states.

These international experiences illustrate that the successful deployment of BESS is closely linked to the existence of transparent legal mandates and tariff frameworks that recognize the economic value of storage. Such frameworks not only guarantee cost recovery but also create an enabling environment that improves investor confidence, encourages technological adoption, and supports long-term system stability. Therefore, the development of a tariff and compensation mechanism is both a regulatory necessity and a strategic intervention for strengthening Zambia's energy security and enabling transition toward a more diversified and resilient electricity sector.

5.3. Conclusion

The conclusion of this study is that while Zambia acknowledges the strategic relevance of Battery Energy Storage Systems in its enhanced and secure future power system, the country's existing legal and regulatory frameworks have not evolved to accommodate this emerging technology.

There is little momentum from Government of Zambia to provide confidence that the law will be revised to adapt to this rapid change occurring in the global electricity industry. Various private sector led initiatives have been documented as intending to deploy storage-only power projects but such initiatives lack the element of bankability related to regulatory and policy issues.

The regulatory silence surrounding storage discourages private sector investment, limits innovation, and slows progress toward national and regional energy transition commitments. The comparative jurisdictions examined demonstrate that regulatory clarity is central to unlocking the socioeconomic and environmental benefits of storage.

In order to facilitate the effective deployment of Battery Energy Storage Systems (BESS), it is necessary to formally recognize energy storage as a distinct and independent activity within the electricity supply chain. At present, Zambia's legal and regulatory frameworks conceptualise the electricity sector primarily in terms of generation, transmission, distribution, and supply, without explicitly acknowledging storage as a standalone function. This omission creates regulatory ambiguity when determining how BESS projects should be classified, licensed, operated, or compensated. As a result, storage developers and investors are left uncertain about the applicable regulatory requirements, which undermines investment confidence and slows the adoption of storage technologies.

Recognising energy storage as an independent activity would involve amending the Electricity Act and associated subsidiary legislation to clearly define storage as a separate category alongside generation, transmission, and distribution. This would provide legal clarity regarding the role of storage systems in the grid and enable the development of tailored licensing procedures, technical standards, and tariff structures. Such a reform would also clarify the institutional responsibilities of regulatory bodies such as the Energy Regulation Board (ERB), and system operators like ZESCO, in relation to approving, integrating, and compensating storage assets.

Comparative experiences from other jurisdictions demonstrate the practical benefits of recognising energy storage as an independent activity. This has enabled storage systems to be deployed not merely as auxiliary infrastructure but as strategic grid assets, resulting in significant growth in storage capacity and improved system flexibility.

Recognizing storage as an independent activity in Zambia would therefore create a legal foundation upon which investment certainty and market participation can be built. It would allow storage technologies to be seen not merely as adjuncts to renewable energy generation, but as critical components of modern power system architecture capable of enhancing energy security, improving grid reliability, moderating supply fluctuations, and supporting the transition towards a diversified generation mix.

By adopting these reforms, Zambia can improve energy reliability, expand renewable energy penetration, reduce dependence on climate-sensitive hydropower, and enhance the overall resilience and sustainability of the electricity system.

5.4. Recommendations

In order for us to resolve the identified regulatory challenges, the study proposes the following:

1. **Legal Recognition of Energy Storage as a Distinct Activity**

   The Electricity Act should be amended to include a statutory definition of energy storage, granting it formal recognition within the electricity supply industry. This will clarify the regulatory status of BESS and establish a basis for subsequent policy and regulatory instruments.

2. **Development of a Standalone Licensing Framework**

   The Energy Regulation Board (ERB) should design a licensing procedure tailored specifically to storage facilities. This framework should clarify application processes, technical requirements, ownership models, and operational parameters, ensuring transparency and predictability.

   Under this framework, a dedicated license could be issued by the ERB to developers and investors in standalone BESS assets. This would provide a platform against which BESS projects could be derisked as part of the bankability process, leading to financial close.

3. **Establishment of Tariff and Compensation Mechanisms**

   There is need to establish and implement a tariff structure targeting storage service such as reserve capacity, grid balancing, and reliability support. For conventional generation systems and conventional loads, these services are commercialised under the concepts of capacity charge and power quality boundaries but this is yet to be reflected in novel technologies. Deliberate tariff structures and compensation mechanisms would enable storage to become a commercially viable investment rather than a purely technical consideration.

4. **Integration of BESS into National Energy Planning Instruments**

   Energy storage should be incorporated into the National Energy Policy, Integrated Resource Plans (IRPs), and electrification strategies to ensure its long-term prioritization and budgetary support.

5. **Development of Grid Codes and Technical Standards for BESS**

   Clear technical and interconnection standards should be developed to ensure safety, reliability, and dependability of storage systems. The operational limits and safety requirements for BESS assets is yet to be ascertained.

6. **Capacity Building and Institutional Strengthening**

   Training programs should be undertaken to enhance the technical and regulatory expertise of government agencies, legal practitioners, engineers, and private developers in the field of energy storage.

5.5. Final Reflections

Improving the legal and regulatory environment for Battery Energy Storage Systems is not only a policy reform objective, but a strategic imperative for Zambia's sustainable energy future. By establishing a clear, predictable, and enabling regulatory environment, Zambia can attract investment, modernise its electricity sector, safeguard national energy security, and advance its transition toward a resilient, low-carbon energy system.

Zambia's electricity sector has historically been dominated by hydropower, which accounts for the vast majority of installed generation capacity. While hydropower has been central to the country's energy development due to its low operating cost and renewable nature, its reliability has come under increasing strain as a result of recurrent droughts and changing climatic conditions. This overreliance on a single generation source has exposed structural vulnerabilities in the country's supply security. Consequently, there is a pressing need to diversify the electricity generation mix in order to improve system resilience, enhance energy security, and support sustained socio-economic development.

Diversification entails the integration of alternative renewable energy resources such as solar photovoltaic (PV), wind energy, biomass, and geothermal power, alongside strategically deployed Battery Energy Storage Systems (BESS). The deployment of BESS forms a critical component of this diversification strategy.

Energy storage improves grid flexibility by enabling the capture and use of excess generation during low-demand periods and releasing it during peak demand. It can also provide frequency regulation, reduce curtailment of renewable resources, and support the integration of off-grid electrification initiatives. Therefore, BESS does not merely supplement new renewable sources—it acts as an enabling technology that allows diversified generation to function efficiently within the national power system. In this context, diversifying the mix is not only a technical necessity but also a legal and regulatory imperative.

The reform of policy and regulatory frameworks must therefore prioritize creating investment conditions that encourage private and public sector participation in non-hydro renewables, while simultaneously establishing clear guidelines for the deployment of storage technologies. Achieving a more balanced generation mix will not only stabilize supply but will also improve the sustainability, resilience, and economic competitiveness of Zambia's electricity system.

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RESEARCH CLEARANCE FORM

NAME: DAVID CHIFUNDO PHIRI **STUDENT NUMBER:** LLB22114929

SUPERVISOR: CHILESHE KATONGO **TOPIC:** AN ASSESSMENT OF THE LEGAL & REGULATORY FRAMEWORKS FOR BATTERY ENERGY STORAGE SYSTEMS IN ZAMBIA AND THEIR READINESS FOR CHANGING POWER SYSTEMS REQUIREMENTS

Stage	Supervisor's Comments	Supervisor's Signature & Date	Student's Signature & Date
Research Proposal	proceed to begin the Research	28/07/2025	25th July, 2025
Chapter 1 – Introduction	Proceed to Chapter 1 to as guided	28/07/2025	25th July 2025
Chapter 2 –	Proceed as guided	15/08/2025	15th August 2025
Chapter 3 –	Proceed to chapter four, with correction	05/09/2025	5th Sept, 2025
Chapter 4 –	Proceed to chapter five	03/10/2025	3rd Oct, 2025

Chapter 5 – Conclusions & Recommendations	compile chapters and proceed.	23/10/2025	23rd Oct, 2025
Abstract, Table of Contents, Bibliography and Appendices	Correct and proceed	23/10/2025	23rd Oct, 2025
First Draft	clear	31/10/2025	31st Oct, 2025
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