

**NAVIGATING UGANDA'S ENERGY TRANSITION: A LEGAL PERSPECTIVE ON  
ENVIRONMENTAL AND ECONOMIC SUSTAINABILITY**

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**UGANDA CHRISTIAN  
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## DECLARATION

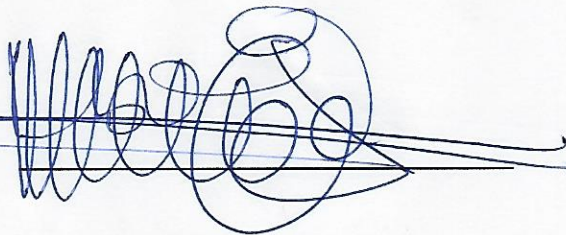
I, ALFRED MADABA, hereby declare that this research study is my work and it has not been submitted to any other institution of higher learning for fulfilment of any academic award.

Signature:  \_\_\_\_\_

Date: 23<sup>rd</sup> September 2024

**APPROVAL**

This is to certify that, this research work entitled; Navigating Uganda's Energy Transition: A Legal Perspective on Environmental and Economic Sustainability has been under my supervision and now it is ready for submission.

Signature: 

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Date: 23 September 2024

## DEDICATION

I dedicate this work to the Almighty God, whose guidance, grace, and unwavering strength have been my foundation throughout this journey.

To my beloved daughters, **Kayla** and **Ashley**, you are my greatest blessings and constant source of inspiration. This work is a testament to my love for you and my hope that you will always strive for excellence and serve others with integrity.

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## ABBREVIATIONS

CBD	-	Convention on Bio-Diversity
DNR	-	Direct Normal Radiation
ECP	-	Electricity Connections Policy
EIA	-	Environmental Impact Assessment
ERA	-	Electricity Regulatory Authority
ERT	-	Energy for Rural Transformation
FIT	-	Feed - in - Tariffs
IOC	-	International Oil Company
LFG	-	Land fill Gas
LNG	-	Liquefied Natural Gas
MEMD	-	Ministry of Energy and Mineral Development
NOC	-	National Oil Company
NST	-	Northern Service Territory
OPEC	-	Organization of Petroleum Exporting Countries
PACMECS Ltd	-	Pader - Abim Community Multi-Purpose Electric Society
PV	-	Photo Voltaic
RE	-	Renewable Energy

REA	-	Rural Electrification Agency
REP	-	Renewable Energy Policy for Uganda, 2007
RESP	-	Rural Electrification Strategy and Plan
RET	-	Renewable Energy Technology
RPS	-	Renewable Portfolio Standards
SD	-	Sustainable Development
SDGs	-	Sustainable Development Goals
SE for All	-	Sustainable Energy for All
SE4A	-	Secretary-General on Sustainable Energy for All
SERMPTE	-	Solar Energy, Renewable Energy, Management, Power, Technology and Environment
UECCC	-	Uganda Energy Credit Capitalisation Company
UEDCL	-	Uganda Electricity Distribution Company Limited
UEGCL	-	Uganda Electricity Generation Company Limited
UETCL	-	Uganda Electricity Transmission Company Limited
UN SDGs	-	United Nations Sustainable Development Goals
UNFCCC	-	United Nations Framework Convention on Climate Change

**Abstract:**

This study explores Uganda's energy transition by evaluating the legal frameworks governing the shift towards renewable energy in order to attain environmental and economic sustainability. Energy transition refers to a shift from carbon-intensive to cleaner energy sources, a global imperative driven by climate change concerns. Uganda, heavily reliant on non-renewable resources, faces challenges in aligning its energy policies with global standards like the Paris Agreement. This research critically examines Uganda's energy laws and policies, analysing their role in promoting renewable energy adoption while addressing barriers to a successful energy transition.

By applying doctrinal and comparative legal research methodologies, the study evaluates the effectiveness of existing laws in supporting sustainable energy initiatives. Through an analysis of national and international frameworks, it identifies gaps and provides recommendations for policy reforms to facilitate a just energy transition. This research is essential to inform policymakers, stakeholders, and scholars as Uganda navigates its legal, environmental, and economic challenges towards achieving sustainable energy goals.

# NAVIGATING UGANDA'S ENERGY TRANSITION:

## A Legal Perspective on Environmental and Economic Sustainability.

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### 1 INTRODUCTION

In an era defined by escalating concerns over climate change and the imperative for sustainable development, the global community has embarked on a transformative journey towards cleaner and more environmentally friendly energy systems. Within this context, developing nations like Uganda face a dual challenge: the urgent need to satisfy their energy demands for economic growth while simultaneously mitigating the environmental impacts associated with conventional energy sources. The thesis titled "Navigating Uganda's Energy Transition: A Legal Perspective on Environmental and Economic Sustainability" delves into this intricate interplay between energy transition, legal frameworks, and the pursuit of environmental and economic sustainability.

Uganda, like many other Sub-Saharan African countries, is characterized by its rich biodiversity, yet its energy landscape heavily relies on non-renewable resources. The dependence on fossil fuels not only hinders the nation's long-term environmental health but also poses economic vulnerabilities due to energy price fluctuations and supply disruptions. Against this backdrop, the proposal critically examines the legal and regulatory mechanisms governing Uganda's energy sector and evaluates their compatibility with the imperatives of sustainable energy development.

Central to the exploration is the concept of energy transition - the fundamental shift from carbon-intensive energy sources to cleaner alternatives. As the global

community rallies behind the Paris Agreement and other international commitments, the proposal scrutinizes Uganda's alignment with these efforts, assessing the degree to which the legal framework supports the integration of renewable energy, energy efficiency measures, and sustainable practices.

The research also acknowledges that embracing a sustainable energy regime involves multifaceted challenges beyond technical and regulatory aspects. Socioeconomic considerations, policy coherence, technological innovation, and public engagement all play pivotal roles in shaping the trajectory of energy transition. By considering these factors in conjunction with legal frameworks, the study seeks to propose holistic strategies that not only accelerate Uganda's energy transition but also foster a balanced approach to environmental preservation and economic prosperity.

In summation, "Navigating Uganda's Energy Transition: A Legal Perspective on Environmental and Economic Sustainability" is a comprehensive proposal into the nexus of law, energy transition, environmental conservation, and economic development in Uganda. By shedding light on the legal barriers and opportunities inherent in the pursuit of sustainable energy, this thesis aspires to contribute not only to academic discourse but also to inform policy decisions that can catalyse a transition towards a more sustainable energy landscape in Uganda and beyond.

## 1.1 Background of The Study

Navigating Uganda's energy transition with a legal perspective on environmental and economic sustainability would require one to understand 'energy transition which is usually defined as a change in the state of an energy system as opposed to a change in an individual energy technology or fuel source.<sup>1</sup> Energy transitions can also result from the depletion of energy sources, for example, whale oil for illumination and wood for iron smelting in Europe.<sup>2</sup>

Reports indicate that energy transition dates far back to the 1850's when Great Britain began mining coal during the Elizabeth Era. This took several centuries before fossil fuels became a universal solution to the quest for heat, light, mechanical motion and movement.<sup>3</sup>

The second important energy transition followed the commercial discovery of crude oil in Pennsylvania in 1859.<sup>4</sup> Initially, the demand for oil was low but after the First World War, it grew quickly, rapidly displacing coal and other sources in many industrialised countries until the Organization of the Petroleum Exporting Countries (OPEC) increased prices.<sup>5</sup>

The third transition came with the invention of the electric bulb and construction of the Pearl Street power generation station in New York City in

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<sup>1</sup> Grübler, A. (1991). "Diffusion: Long-Term Patterns and Discontinuities". *Technological Forecasting and Social Change*. 39 (1–2): 159–180. Doi:10.1016/0040-1625(91)90034-D

<sup>2</sup> Ibid

<sup>3</sup> Van Vactor, Samuel A, (2018) 'Historical Perspective on Energy Transitions' USAEE Working Paper <http://dx.doi.org/10.2139/ssrn.3178176> accessed 26 April 2023

<sup>4</sup> Ibid

<sup>5</sup> Ibid

1882.<sup>6</sup> That transition turned night to day, with electricity becoming the most important energy form in modern life.<sup>7</sup>

The current transition to renewable energy, and perhaps other types of sustainable energy, differs as it is largely driven by a recognition that global carbon emissions must be brought to zero, and since fossil fuels are the largest single source of carbon emissions, the quantity of fossil fuels that can be produced is limited by the COP 21 Paris Agreement of 2015 to keep global warming below 1.5 °C.<sup>8</sup> In recent years, the term energy transition has been coined in the framework of a move towards sustainability through increased integration of renewable energy in the realm of daily life.<sup>9</sup>

This current transition is majorly governed by the precepts of the Paris Agreement. The Paris Agreement is a legally binding international treaty on climate change. It was adopted by 196 Parties at COP 21 in Paris, on 12<sup>th</sup> December 2015 and entered into force on 4<sup>th</sup> November 2016.<sup>10</sup> Its goal is to limit global warming to well below 2 degrees Celsius, preferably to 1.5 degrees Celsius, compared to pre-industrial levels. To achieve this long-term temperature goal, countries aim to reach global peaking of greenhouse gas emissions as soon as possible to achieve a climate-neutral world by mid-century.<sup>11</sup> The Paris Agreement is a landmark in the multilateral climate change process because, for the first time, a binding agreement brings all

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<sup>6</sup> Ibid

<sup>7</sup> Ibid

<sup>8</sup> United Nations Framework Convention on Climate Change (UNFCCC), "The Paris Agreement," UNFCCC. Available at: <https://unfccc.int/Process-And-Meetings/The-Paris-Agreement/The-Paris-Agreement> (Accessed 23 May 2023).

<sup>9</sup> Ibid

<sup>10</sup> Ibid

<sup>11</sup> Ibid

nations into a common cause to undertake ambitious efforts to combat climate change and adapt to its effects.<sup>12</sup>

With such different trends in energy transition, reports show that contemporary energy transitions usually differ in terms of motivation and objectives, drivers and governance.<sup>13</sup> The layout of the world's energy systems has changed significantly over time. Since the beginning of the Industrial Revolution, the global economy has extracted and used 0.5 trillion tonnes of oil equivalent of fossil fuels and has led to 1.2 trillion tonnes of carbon dioxide emissions.<sup>14</sup> The rising global emissions, along with other greenhouse gas emissions, are threatening to intensify climate change. This threat means that fossil fuels, without worldwide carbon capture and sequestration mechanisms or successful geo-engineering projects, will impose a rising burden on the atmosphere.<sup>15</sup> This burden highlights the potential benefits of a transition from fossil fuels to low-carbon energy sources.

With such a background, it is imperative to understand that the world is on a high trend of transitioning to energy use which does not affect climate change. Therefore, it is important to understand that this transition does not only affect countries in themselves but also affects operating companies providing the energy and offering it as a business. This study seeks to assess the current legal framework, examine the viability of renewable energy sources, evaluate

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<sup>12</sup> Ibid

<sup>13</sup> Fouquet, Roger (2016) *Historical Energy Transitions: Speed, Prices and System Transformation*. Energy Research & Social Science, 22. Pp. 7-12. ISSN 2214-6296

<sup>14</sup> Ibid

<sup>15</sup> Ibid

socio-economic challenges associated with renewable energy integration and propose policy recommendations for Uganda's sustainable energy transition.

## **1.2 Problem Statement**

Despite the increasing global consensus on the urgency of transitioning towards sustainable energy systems, numerous developing countries, including Uganda, continue to grapple with the complex challenge of balancing their growing energy needs with environmental and economic sustainability. In Uganda, the energy landscape is characterized by a heavy reliance on non-renewable resources, posing significant environmental risks and economic vulnerabilities. This problem statement addresses the need to explore and understand the legal regime governing energy in Uganda, with a focus on the barriers and opportunities it presents for achieving a successful energy transition. The overarching concern is how Uganda can effectively integrate renewable energy sources, energy efficiency measures, and sustainable practices within its legal framework to pave the way for environmental preservation and economic development while navigating the intricate process of energy transition.

## **1.3 Study Objectives**

### **1.3.1 Main Objective**

The general objective of this proposal is to assess and propose strategies for the effective integration of sustainable energy practices within Uganda's legal framework, aiming to facilitate a comprehensive energy transition that harmonizes environmental conservation with economic development.

### **1.3.2 Specific Objectives**

- a. To critically analyse the current legal and regulatory framework governing energy practices in Uganda, with a focus on its alignment with principles of environmental sustainability and economic growth.
- b. To assess the feasibility and effectiveness of integrating renewable energy sources within Uganda's legal framework, considering the potential for reducing environmental impact and promoting long-term economic stability.
- c. To identify and evaluate the socio-economic challenges and opportunities associated with transitioning towards sustainable energy sources within the existing legal regime, emphasizing the need for a balanced approach to development.
- d. To propose comprehensive recommendations for legal and policy enhancements that can facilitate a seamless energy transition in Uganda, fostering a harmonious convergence of environmental preservation and economic prosperity in line with global efforts towards sustainable development.

## **1.4 Research Questions**

**1.4.1** How well does the current legal and regulatory framework in Uganda address the integration of sustainable energy practices in terms of both environmental conservation and economic growth?

**1.4.2** What are the potential benefits and challenges associated with the incorporation of renewable energy sources, such as solar and wind power, within the existing legal framework in Uganda?

**1.4.3** How do socio-economic factors influence the adoption and implementation of sustainable energy solutions in Uganda, and what legal measures can be taken to ensure a balanced approach to development?

**1.4.4** What specific legal and policy recommendations can be formulated to enhance Uganda's legal regime for sustainable energy, fostering a transition that aligns with global environmental goals while promoting long-term economic sustainability?

## **1.5 Scope of The Study**

The scope of this study encompasses a comprehensive analysis of Uganda's legal regime concerning sustainable energy practices, with a specific focus on its implications for environmental and economic sustainability. The research will delve into the existing legal frameworks governing energy production, distribution, and consumption, examining their alignment with global sustainable development goals and energy transition principles. The scope further extends to evaluating the feasibility and effectiveness of integrating renewable energy sources, such as solar, wind, and hydropower, within the legal framework. Socio-economic factors influencing the adoption of sustainable energy practices will be explored, including their potential impacts on economic growth, job creation, and community well-being. Additionally, this study will encompass an assessment of potential challenges and barriers faced by stakeholders within the legal regime, particularly those related to solar energy integration. The research will culminate in the formulation of targeted recommendations aimed at enhancing Uganda's legal framework to better facilitate a harmonious convergence of environmental conservation and economic prosperity through sustainable energy practices.

The time scope of this study spans from the present to the last decade, encompassing developments in Uganda's legal framework for sustainable energy and energy transition efforts. The study examines the effectiveness of policies and regulations enacted during this period in promoting environmental and economic sustainability. Geographically, the study focuses exclusively on Uganda, analysing the country's specific legal regime governing energy practices and its implications for sustainable development.

The subject scope of this research centres on the intersection of legal frameworks, energy transition, environmental conservation, and economic growth within Uganda. It explores the integration of renewable energy sources, primarily solar, within the legal framework, considering their socio-economic impacts and potential barriers. The study does not extend to an exhaustive analysis of other energy sources or regions outside Uganda.

## **1.6 Justification for The Study**

The justification for conducting this study is underscored by the critical imperative to address the pressing challenges posed by energy transition, environmental degradation, and economic growth in Uganda. As the nation navigates its developmental trajectory, the need to balance energy demands with environmental sustainability is paramount. The study's rationale is further bolstered by the intricate role of legal frameworks in shaping energy policies and practices. By investigating the compatibility of Uganda's legal regime with sustainable energy goals, this research aims to bridge the gap between theoretical ideals and practical implementation. Moreover, the study responds to the global call for action on climate change and sustainable development,

aligning with international commitments like the Paris Agreement. With the potential to guide policy formulation, attract investments, and foster holistic development, this study's justification rests on its capacity to provide actionable insights that harmonize environmental preservation and economic advancement within the framework of a robust legal regime tailored to Uganda's unique context.

### **1.7 Significance of The Study**

The significance of this study resides in its capacity to facilitate transformative change at the nexus of legal frameworks, energy transition, environmental preservation, and economic growth within Uganda. By elucidating the intricate relationship between legal structures and sustainable energy practices, this research offers vital implications: informing nuanced policy decisions that harmonize renewable energy integration with economic advancement; striking a balance between energy demand and ecological well-being; attracting investment through clear legal guidance; enhancing Uganda's global image by aligning with sustainable development objectives; fostering capacity-building initiatives; engaging communities in advocating for renewable energy; and inspiring further research endeavours. Ultimately, this study's importance lies in its potential to drive a holistic and legally supported transition towards sustainable energy, propelling Uganda towards environmental and economic sustainability while positioning it favourably on the international stage.

### **1.8 Limitations of The Research**

Several limitations may impact the scope and depth of this research focused on the legal framework for sustainable energy practices in Uganda. Firstly, the

study's reliance on governmental organizations and ministries may result in a potential bias towards official viewpoints, potentially overlooking community perspectives and grassroots initiatives that also contribute to energy transition. Additionally, the research's emphasis on specific ministries may omit other influential stakeholders within Uganda's energy landscape, such as private sector entities and local environmental organizations, which could provide valuable insights. Furthermore, the dynamic nature of policy development and implementation might affect the accuracy of the study's findings if policy changes occur during the research process. The study's geographical focus on Kampala, while offering concentrated insights, might not fully capture regional variations in sustainable energy practices and legal challenges across Uganda. Lastly, the availability of accurate and up-to-date information from certain organizations may be limited, potentially constraining the comprehensiveness of the study's analysis.

## **1.9 Chapter Synopsis**

Chapter 1 introduces the research, outlining the background, problem statement, and objectives. It sets the scope and significance of the study, while justifying the need to evaluate Uganda's energy transition from a legal perspective.

Chapter 2 provides a comprehensive review of literature on energy transition, examining global and regional trends with a focus on renewable energy integration in Uganda. The chapter critically analyses the existing academic discourse in relation to the study objectives.

Chapter 3 details the research methodology, explaining the doctrinal approach and data collection methods. The chapter also discusses ethical considerations relevant to the study.

Chapter 4 offers a legal and policy framework analysis, exploring the alignment between Uganda's energy laws and sustainability goals.

Finally, Chapter 5 presents the findings, recommendations, and conclusions, focusing on policy enhancements to strengthen renewable energy adoption in Uganda.

## 1.10 Definition of Key Terms in The Study

- a. **Economic Sustainability** The capacity to maintain and enhance economic well-being over time, considering factors like steady economic growth, job creation, and equitable distribution of benefits.
- b. **Energy Transition:** The fundamental shift from reliance on non-renewable, fossil fuel-based energy sources to renewable and sustainable alternatives to address environmental concerns and ensure future energy security. Energy transition is a significant structural change in an energy system. Historically, these changes have been driven by the demand for and availability of different fuels. In this study the concentration will be on the energy transition to the use of clean energy or what is mostly referred to as renewable energy, one that does not affect the climate in as far as global warming is concerned. It is also said that this kind of transition will help to preserve the climate for future generations to come.
- c. **Environmental Sustainability:** The responsible management of resources and practices to protect and preserve the environment, minimizing negative impacts and promoting ecological balance.
- d. **Legal Regime:** Refers to the comprehensive system of laws, regulations, policies, and institutions governing a specific area, in this case, the energy sector, which guides and shapes the practices and behaviors of stakeholders.
- e. **Renewable Energy:** Energy derived from sources that are naturally replenished, such as solar, wind, hydropower, and geothermal energy, offering a more environmentally friendly alternative to fossil fuels.

- f. Socio-economic Factors: Social and economic conditions and influences that impact decision-making and behaviors, such as employment, income distribution, and community dynamics.
- g. Sustainable Energy: Energy sources and practices that meet the current energy needs without compromising the ability of future generations to meet their own needs, focusing on reduced environmental impact and long-term viability.

### **1.11 Conceptual and Theoretical Framework**

This study navigates Uganda's energy transition through both a conceptual and theoretical lens, focusing on the intersection of law, environmental sustainability and economic development. Given the interdisciplinary nature of the subject, this research adopts a hybrid framework, first introducing the conceptual framework to define and relate key variables such as energy transition, legal frameworks and socio-economic impacts. Subsequently, the theoretical framework is introduced to ground the analysis in Sustainable Development Theory and Environmental Law Theory, which offer normative and analytical tools for evaluating Uganda's legal regime in the context of energy transition.

#### **1.11.1 Conceptual Framework**

The conceptual framework for this research is structured around three key elements: energy transition, legal frameworks and socio-economic impacts. This framework guides the study by linking the legal structures governing

energy in Uganda to the broader goals of environmental sustainability and economic development.

- a. **Energy Transition:** This refers to the shift from reliance on non-renewable energy sources, primarily fossil fuels, to renewable energy (e.g., solar, wind, and hydropower). In the global context, energy transition is often seen as a necessity for mitigating climate change and promoting sustainable development. For Uganda, this transition is crucial in reducing the country's dependency on non-renewable energy sources and aligning with international climate commitments, such as the Paris Agreement.
- b. **Legal Frameworks:** Uganda's legal framework encompasses all laws, regulations, and policies governing energy production, distribution, and environmental conservation. This research examines the effectiveness of Uganda's energy laws in supporting the transition to renewable energy. It explores whether the current legal structures adequately promote renewable energy adoption while ensuring environmental protection and economic growth.
- c. **Socio-economic Impacts:** Energy transition in Uganda must balance environmental objectives with socio-economic priorities such as job creation, rural electrification, poverty alleviation and economic diversification. This research analyses how Uganda's legal framework impacts these socio-economic factors, particularly focusing on the challenges and opportunities created by the transition to renewable energy sources.

The conceptual framework is visualized as an interaction between these three elements and informs the research methodology by guiding data collection, analysis and interpretation. It helps identify how legal frameworks support or hinder the energy transition and its socio-economic outcomes.

### **1.11.2 Theoretical Framework**

To anchor the research in a broader analytical context, this study draws on Sustainable Development Theory and Environmental Law Theory. These theoretical frameworks offer the necessary foundation for critically assessing Uganda's energy transition within the legal and policy domains.

- a. Sustainable Development Theory: The Sustainable Development Theory posits that development should meet the needs of the present without compromising the ability of future generations to meet their own needs. This theory is central to the global discourse on energy transition, as it advocates for energy systems that support both environmental and economic sustainability.
- b. Application to Research: Uganda's energy transition is evaluated through the lens of sustainability, assessing whether the current legal framework fosters economic growth while protecting environmental resources for future generations. This theory helps to assess whether Uganda's legal structures align with sustainable energy goals, such as those outlined in the United Nations Sustainable Development Goals (SDGs) and the Paris Agreement.

- c. Environmental Law Theory: Environmental Law Theory examines the role of legal mechanisms in regulating and enforcing environmental protection. It explores how laws, policies, and regulations can be used to manage natural resources and reduce environmental degradation.
- d. Application to Research: This theory underpins the analysis of Uganda's legal and regulatory frameworks by focusing on their capacity to facilitate renewable energy adoption and enforce compliance with environmental standards. The theory provides a normative structure for evaluating whether Uganda's legal provisions are sufficiently robust to address the environmental challenges posed by energy production and consumption.

### **1.11.3 Selection of Framework**

This research adopts Sustainable Development Theory as the primary theoretical framework, given the dual emphasis on environmental sustainability and economic growth in Uganda's energy transition. The theory is particularly relevant as it aligns closely with Uganda's development goals, the Paris Agreement, and the Sustainable Development Goals (SDGs), all of which emphasize the need for an integrated approach to energy governance that ensures economic prosperity without undermining environmental sustainability.

While Environmental Law Theory provides a complementary perspective, its narrower focus on legal enforcement makes it less suitable as the overarching framework for this research. However, the principles of environmental law will

still be applied to assess the efficacy of Uganda's legal instruments in promoting renewable energy and environmental protection.

By grounding this research in Sustainable Development Theory, the study ensures a holistic approach that accounts for the complex interplay between energy, environment, and economy, providing a well-rounded analysis of Uganda's legal regime for energy transition.

#### **1.11.4 Conclusion**

The integration of the conceptual framework with the Sustainable Development Theory provides the foundation for this research. The conceptual framework offers a structured approach to understanding the key variables, while the theoretical framework allows for a critical assessment of Uganda's legal and regulatory environment in fostering sustainable energy development. Together, these frameworks ensure that the research is not only grounded in theoretical understanding but also capable of delivering practical insights into Uganda's energy transition.

## 2 LITERATURE REVIEW

### 2.1 Introduction

The global shift from fossil fuels to renewable energy, commonly referred to as the energy transition, represents one of the most significant challenges in the modern pursuit of sustainable development. While advanced economies have made strides in transitioning to renewable energy sources, developing nations, including Uganda, continue to grapple with balancing their increasing energy needs with the imperatives of environmental and economic sustainability. Legal frameworks play a critical role in mediating this transition, especially in regions where energy systems remain underdeveloped or heavily reliant on non-renewable resources.

In Uganda, the energy landscape is characterized by a dependence on fossil fuels and biomass, which exacerbates both environmental degradation and economic vulnerabilities<sup>16</sup>. Given Uganda's commitments under international agreements like the Paris Agreement, there is an urgent need to explore the extent to which its legal regime is equipped to support the shift towards renewable energy<sup>17</sup>. This chapter provides a critical review of the existing literature on energy transition, with a particular focus on the legal, regulatory and policy frameworks that govern Uganda's energy sector. It also examines the socio-economic challenges and opportunities inherent in such a transition.

The literature on energy transition spans multiple disciplines, including environmental law, sustainable development, and economic policy. However, much of the existing research tends to focus either on technological solutions or the global energy transition, often overlooking the unique legal and socio-economic contexts of developing nations like Uganda<sup>18</sup>. This review aims to

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<sup>16</sup> Owusu, P. A., & Asumadu-Sarkodie, S. (2016). A review of renewable energy sources, sustainability issues and climate change mitigation. *Cogent Engineering*, 3(1), 1167990.

<sup>17</sup> UNFCCC (n 8)

<sup>18</sup> M Irani, 'Technical and Economical Aspects of Use of Solar Energy in the Oil & Gas Industry in the Middle East' (SPE International Heavy Oil Conference and Exhibition, 2018); National Association of Professional

bridge that gap by critically assessing both international and local scholarly contributions, with a view to aligning the literature more closely with the specific objectives of this study.

The objectives of this review are fourfold. First, it seeks to critically examine the literature on Uganda's legal and regulatory frameworks governing energy, highlighting their alignment—or misalignment—with sustainable development goals<sup>19</sup>. Second, it assesses the feasibility and effectiveness of integrating renewable energy sources such as solar and wind power into Uganda's legal regime<sup>20</sup>. Third, it explores the socio-economic factors that influence Uganda's energy transition, particularly the implications for rural communities and vulnerable populations<sup>21</sup>. Lastly, the review provides a foundation for the development of policy recommendations, drawing on comparative legal frameworks from other developing nations, to enhance Uganda's capacity to navigate this complex transition.

In this chapter, the literature is organized thematically to correspond with the specific objectives of the research. Each section critically engages with existing works, identifying gaps, challenges, and opportunities for Uganda's legal framework in achieving a just and sustainable energy transition.

## 2.2 Energy Transition and Legal Frameworks

The energy transition from fossil fuels to renewable energy requires a robust legal framework to facilitate smooth integration, particularly in developing countries like Uganda. This section critically evaluates the literature on energy law and policy frameworks, identifying how these frameworks either advance

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Environmentalists, 'A Study on the Use and Viability of Solar Energy in Uganda' (2021) <https://www.nape.or.ug/publications/energy> accessed 23 May 2023.

<sup>19</sup> Wawryk, A. (2014). International energy law: An emerging academic discipline. In P. Babie & P. Leadbeter (Eds.), *Law as Change: Engaging with the Life and Scholarship of Adrian Bradbrook* (pp. 223-256). University of Adelaide Press.

<sup>20</sup> Owusu and Asumadu-Sarkodie (n 16); Irani (n 18).

<sup>21</sup> Raybould, B., Cheung, W. M., Connor, C., & others. (2020). An investigation into UK government policy and legislation to renewable energy and greenhouse gas reduction commitments. *Clean Technologies and Environmental Policy*, 22, 371-387.

or impede Uganda's efforts toward a sustainable energy future. It also examines the alignment of Uganda's legal regime with global best practices and environmental commitments, such as the Paris Agreement and Sustainable Development Goals (SDGs).

### **2.2.1 Analysis of Global Energy Transition Frameworks:**

Globally, the transition to renewable energy is governed by various legal and regulatory frameworks that vary significantly across jurisdictions. According to Grübler (1991), energy transitions are long-term processes shaped by a combination of technological innovations and policy frameworks, with legal structures playing a crucial role in managing these transitions. In developed economies, legal systems have evolved to integrate renewable energy efficiently. However, developing countries like Uganda still struggle with outdated or incomplete legal frameworks that are often misaligned with contemporary sustainability goals<sup>22</sup>.

Fouquet (2016) emphasizes that legal frameworks in developing countries, especially in Africa, are heavily dependent on fossil fuel economies, making the transition to renewable energy politically and legally challenging. Uganda's legal framework, while progressive on paper, lacks clear, enforceable mechanisms that could enable renewable energy to become a significant player in the energy mix. The Renewable Energy Policy (2007) and subsequent revisions in 2019 illustrate Uganda's intent to transition; however, gaps in implementation have limited their effectiveness. NAPE (2021) identifies key weaknesses in Uganda's energy laws, such as the lack of incentives for private investment in renewable energy and insufficient regulatory support for innovation in energy technologies.

### **2.2.2 Legal and Regulatory Challenges in Uganda:**

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<sup>22</sup> S.A Van Vactor, (2017) Historical Perspective on Energy Transitions

Uganda's energy laws are centered on a fossil fuel-based economy, as shown by the dominance of legal instruments like the Electricity Act (1999) and the Petroleum (Exploration, Development & Production) Act (2013). These laws reflect Uganda's historical reliance on fossil fuels and its more recent interest in oil exploration. However, Owusu and Asumadu-Sarkodie (2016) argue that for Uganda to achieve its energy transition goals, its legal framework must evolve to prioritize renewable energy sources, such as solar, wind, and hydroelectric power, while reducing bureaucratic and legal obstacles.

Despite legislative efforts, Mazda Irani (2018) critiques Uganda's energy law for being reactionary rather than proactive in addressing the pressing needs of energy transition. The Biofuels Act (2018), while a step towards embracing cleaner energy, has faced criticism for lacking clarity on implementation strategies. Additionally, Uganda's Renewable Energy Feed-in-Tariff (REFiT), designed to encourage investment in renewable energy, has been critiqued by NAPE (2021) for its limited scope and inconsistent application, resulting in suboptimal outcomes in solar energy development.

The National Oil and Gas Policy (2008) provides a clear framework for fossil fuel exploitation but is silent on how oil and gas activities should transition towards renewable alternatives. This demonstrates a misalignment with the global push towards carbon-neutral energy systems, particularly those outlined in the Paris Agreement. Wawryk (2014) argues that for Uganda's energy transition to be successful, the country's energy laws must incorporate more binding provisions on renewable energy, enforce penalties for non-compliance with environmental standards, and ensure legal incentives for green investments. As the world transitions to renewable energy, Uganda's laws remain inadequate in providing a robust framework for a just and effective energy transition.

### **2.2.3 Comparative Legal Frameworks:**

International best practices, such as South Africa's Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), provide a

useful benchmark for Uganda's energy law reform. Choifin (2021) points out that South Africa's legal framework, which mandates the procurement of renewable energy from independent producers, has been instrumental in reducing the country's reliance on coal and accelerating its energy transition. Uganda could benefit from adopting similar provisions, particularly through reforms in the Electricity Act to open up the grid to independent renewable energy producers. Wawryk (2014) suggests that incorporating provisions that allow for easier entry of renewable energy investors into Uganda's market could mitigate many of the current regulatory barriers.

In contrast, Mazda Irani (2018) observes that many countries in the Middle East, despite their vast oil reserves, have begun adopting laws that explicitly integrate solar energy into their legal and economic frameworks. Such a transition is driven by global market pressures and environmental commitments. Uganda can draw valuable lessons from these jurisdictions, particularly in creating legal frameworks that balance the economic interests of fossil fuel industries with the growing necessity for clean energy. Fouquet (2016) recommends that Uganda adopt a hybrid legal framework that accommodates its fossil fuel economy while actively promoting renewable energy adoption.

#### **2.2.4 Conclusion:**

The literature on energy law and policy in Uganda highlights significant gaps between the aspirational goals of energy transition and the practical realities of legal enforcement. Uganda's legal regime remains anchored in a fossil fuel-dependent energy system, with only limited provisions for renewable energy integration. Scholars like NAPE (2021) and Owusu and Asumadu-Sarkodie (2016) argue that Uganda must adopt a more comprehensive legal framework that not only incentivizes renewable energy investment but also imposes binding obligations on energy companies to transition towards more sustainable practices. The current legal frameworks, while progressive in theory, lacks the enforcement mechanisms necessary to drive a successful energy transition.

Further reforms are needed to align Uganda's laws with global trends and sustainability goals.

### 2.3 Renewable Energy Integration in Uganda

The global shift towards renewable energy presents unique challenges and opportunities for Uganda, a country that is heavily reliant on non-renewable energy sources. As Uganda seeks to integrate renewable energy sources like solar, wind, and hydropower, a critical assessment of the feasibility and effectiveness of such integration within the existing legal framework is necessary.

Mazda Irani (2018) emphasizes that the transition to renewable energy in developing countries is often hampered by outdated or insufficient legal frameworks, which are poorly aligned with the demands of modern energy systems. While solar energy, for example, has proven technically viable in regions like the Middle East, Irani argues that policy incoherence and regulatory bottlenecks in many developing countries, including Uganda, limit large-scale implementation<sup>23</sup>. This is particularly relevant for Uganda, where solar energy could potentially provide a significant portion of the nation's energy needs, yet the regulatory environment has not fully evolved to support its large-scale deployment.

Furthermore, Phebe Asantewaa Owusu et al. (2016) highlights that renewable energy integration requires robust legal and policy structures that incentivize investment and reduce the risks associated with transitioning from fossil fuels. In their study of renewable energy in Africa, Owusu et al. argue that while there is significant potential for renewable energy development in Uganda, challenges such as limited financing options, inadequate infrastructure, and poor regulatory frameworks have stymied progress<sup>24</sup>. The Ugandan government has made attempts to support renewable energy through policies like the

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<sup>23</sup> Irani (n 18)

<sup>24</sup> Owusu and Asumadu-Sarkodie (n 16)

Renewable Energy Policy of 2007, but these efforts have often been fragmented and poorly enforced.

NAPE (2021) further supports this view, noting that while Uganda possesses abundant renewable energy resources, particularly in solar and hydropower, the legal and institutional frameworks necessary to exploit these resources are underdeveloped<sup>25</sup>. The study underscores that the existing legal regime is inadequate in addressing the technical and financial barriers to renewable energy integration. For example, there are limited fiscal incentives for private sector participation in renewable energy projects, and bureaucratic hurdles often delay project implementation. This is corroborated by Choifin (2021), who emphasizes that regulatory flexibility and government support are critical for the successful adoption of renewable energy technologies. In countries like Indonesia, targeted government policies have accelerated renewable energy integration by creating a conducive environment for investment<sup>26</sup>. Uganda, however, lacks such targeted policy support, which remains a significant barrier to integrating renewable energy into its national grid.

Moreover, Wawryk (2014) discusses how international best practices in energy law could inform Uganda's regulatory reform. Wawryk argues that countries which have successfully integrated renewable energy sources into their energy mix have typically adopted a mix of regulatory strategies, including feed-in tariffs, renewable portfolio standards, and government subsidies<sup>27</sup>. Uganda has yet to implement such comprehensive legal reforms. The absence of clear legal mandates for renewable energy targets or incentives to promote renewable energy development within the private sector reflects a significant gap in the Ugandan legal framework. For instance, the Electricity Act of 1999, which governs much of Uganda's energy sector, lacks provisions for incentivizing renewable energy sources, limiting the scope for growth in this sector.

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<sup>25</sup> NAPE (n 18)

<sup>26</sup> Mochamad Choifin, 2021. A Study of Renewable Energy and Solar Panel Literature Through Bibliometric Positioning During Three Decades, University of Nebraska – Lincoln, Library Ph ILO sophy and Practice (E-Journal). 5749. <https://Digitalcommons.Unl.Edu/Libphilprac/5749>

<sup>27</sup> Wawryk (n 19)

On the international front, Raybould et al. (2020) point out that global agreements such as the Paris Agreement require signatory countries to align their national policies with renewable energy targets. While Uganda is a signatory to the Paris Agreement, its domestic legal framework remains largely disconnected from these international obligations<sup>28</sup>. The lack of harmonization between Uganda's energy laws and its international climate commitments further complicates the feasibility of achieving a robust renewable energy infrastructure. This disconnect underscores the importance of updating Uganda's legal framework to better align with global energy transition goals.

Finally, the issue of institutional capacity is crucial. According to Owusu et al. (2016), effective renewable energy integration requires not only supportive laws but also institutions capable of enforcing them. In Uganda, key institutions such as the Electricity Regulatory Authority (ERA) and the Uganda Energy Credit Capitalisation Company (UECCC) have struggled to implement and monitor renewable energy projects due to limited financial and human resources. This lack of capacity further reduces the effectiveness of the current legal framework in supporting renewable energy integration.

### 2.3.1 Conclusion

The literature reveals that while Uganda has significant potential for renewable energy integration, its legal framework is not yet fully conducive to large-scale adoption of renewable energy technologies. Various scholars, including Irani (2018) and Owusu et al. (2016), underscore the need for comprehensive legal reforms to address regulatory gaps and align national policies with international commitments. These findings indicate that for Uganda to effectively transition towards renewable energy, it must prioritize legal reforms that incentivize investment, streamline regulatory processes, and enhance institutional capacity.

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<sup>28</sup> Raybould (n 21)

## 2.4 Socio-economic Challenges and Opportunities in Uganda's Energy Transition

The transition to sustainable energy is not merely a technical or legal issue but also involves significant socio-economic dimensions. In Uganda, where approximately 85% of the population lives in rural areas and over 80% relies on biomass for energy, transitioning to renewable energy sources presents both challenges and opportunities<sup>29</sup>. This section reviews the existing literature on the socio-economic implications of energy transitions, particularly focusing on job creation, access to energy, economic development, and poverty reduction within the context of Uganda's legal framework.

### 2.4.1 Socio-economic Challenges in Uganda's Energy Transition

Several socio-economic barriers continue to hinder Uganda's transition to renewable energy. One of the primary challenges is energy poverty. Despite significant investments in hydropower and solar energy, only 42% of Uganda's population had access to electricity as of 2021, with rural access lagging at just 18%<sup>30</sup>. This stark disparity highlights the limitations of current legal and policy frameworks in ensuring equitable access to energy resources.

NAPE (2021) points out that the high upfront costs of renewable energy technologies (such as solar panels and wind turbines) place them out of reach for many Ugandan households and businesses. Additionally, inadequate financing mechanisms and a lack of subsidies for renewable energy further exacerbate the problem, leaving rural communities heavily dependent on biomass, which has adverse environmental and health impacts. This situation is compounded by regulatory barriers, where overly complex licensing processes and insufficient policy incentives discourage investment in renewable energy projects in rural areas<sup>31</sup>.

Moreover, the legal regime governing land ownership in Uganda poses a significant challenge. Owusu and Sarkodie (2016) emphasize that disputes over

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<sup>29</sup> NAPE (n 18)

<sup>30</sup> Owusu and Asumadu-Sarkodie (n 16)

<sup>31</sup> NAPE (n 18)

land rights, particularly in rural areas, have delayed the construction of renewable energy infrastructure such as solar farms and wind projects. The lack of clear regulations on land use for energy projects further complicates the issue, making it difficult for developers to secure land for large-scale renewable energy projects.

#### **2.4.2 Opportunities for Economic Development and Job Creation**

Despite these challenges, the energy transition offers significant economic opportunities, particularly in terms of job creation and economic diversification. According to Raybould et al. (2020), renewable energy sectors, particularly solar and wind, have the potential to create thousands of jobs in developing countries. Uganda stands to benefit from this potential if the legal and policy frameworks are adjusted to incentivize investment in renewable energy.

For instance, the development of solar energy projects has already begun to generate jobs in installation, maintenance, and operation. However, as Choifin (2021) argues, the real potential lies in the creation of a local renewable energy supply chain, which could provide employment not only in the construction and maintenance of energy infrastructure but also in the manufacturing of solar panels and other renewable energy technologies. Such a development could reduce Uganda's reliance on imported energy technologies and help local industries flourish, contributing to both economic growth and energy security.

In addition, Owusu and Sarkodie (2016) argue that the transition to renewable energy can stimulate economic development by reducing the country's dependence on imported fossil fuels, which are subject to price volatility and international market fluctuations. By developing local renewable energy sources, Uganda can improve its energy security and reduce its trade deficit, which stood at US\$3.6 billion in 2020. This, in turn, would create more stable economic conditions and provide the government with the financial flexibility

to invest in social services, such as education and healthcare, thereby improving overall living standards.

### **2.4.3 Addressing Socio-economic Imbalances Through Legal Reforms**

While the socio-economic opportunities of energy transition are vast, Uganda's legal framework must be reformed to ensure these benefits are equitably distributed. Raybould et al. (2020) suggest that without targeted policies, the benefits of renewable energy may be concentrated in urban areas and among wealthier populations, exacerbating existing inequalities. To prevent this, Uganda's legal regime needs to incorporate mechanisms that prioritize rural electrification and ensure that the financial and social gains from energy projects reach marginalized communities.

NAPE (2021) further highlights that the government must introduce financing models tailored to the needs of rural populations, such as microfinance schemes and community-owned energy projects. These models would allow local communities to invest in renewable energy infrastructure and retain a stake in the profits, fostering community ownership and promoting sustainable development from the ground up.

Additionally, the literature points to the need for public-private partnerships (PPPs) in scaling up renewable energy access. Choifin (2021) advocates for a legal framework that encourages collaboration between the government, private investors, and local communities to jointly develop and manage renewable energy projects. Such partnerships could help overcome financial and technical barriers while ensuring that the socio-economic benefits of energy transition are broadly shared.

### **2.4.4 Policy Recommendations**

To maximize the socio-economic benefits of Uganda's energy transition, the legal and policy frameworks must be revised to:

- a. Expand access to affordable financing mechanisms for renewable energy projects, particularly in rural areas.
- b. Simplify regulatory processes to encourage private investment in renewable energy.
- c. Incorporate community-based energy models into national policy, ensuring that rural populations can participate in and benefit from renewable energy development.
- d. Promote local manufacturing of renewable energy technologies to stimulate job creation and economic growth.

By addressing these areas through legal reform, Uganda can unlock the socio-economic potential of its energy transition, ensuring that it not only meets its energy needs but also fosters inclusive economic development and poverty reduction.

#### **2.4.5 Conclusion**

In summary, while Uganda faces significant socio-economic challenges in its transition to renewable energy, there are also considerable opportunities for economic growth, job creation, and poverty reduction. However, to realize these opportunities, Uganda must overhaul its legal and regulatory framework to ensure that the benefits of energy transition are equitably distributed, particularly to rural populations. The literature highlights the importance of financial reforms, community ownership models and public-private partnerships in driving the socio-economic success of Uganda's energy transition.

### **2.5 Legal and Policy Recommendations for Uganda's Energy Transition**

The effective transition from fossil fuels to renewable energy in Uganda requires a robust legal framework that addresses both regulatory barriers and

incentivizes investment in sustainable energy practices. Several studies have highlighted the importance of adapting global best practices to Uganda's unique socio-economic and environmental landscape. However, while these recommendations are plentiful, gaps remain in their applicability to Uganda's legal and institutional context.

### **2.5.1 Global and Regional Best Practices in Legal Reforms**

Scholars like Wawryk (2014) argue that energy law has become an increasingly internationalized field, driven by the need for harmonized standards across jurisdictions. In the global south, Adrian Bradbrook's work emphasizes the role of international agreements, like the Paris Agreement, in pushing governments towards comprehensive energy reforms that encourage renewable energy adoption. While Uganda has made strides by signing onto international climate commitments, Wawryk (2014) notes that translating these international obligations into domestic legal reforms has proven to be a major challenge, particularly in countries like Uganda where institutional capacities are limited.

In Africa, Choifin (2021) shows how legal reforms in countries like South Africa and Kenya have succeeded in creating enabling environments for renewable energy investments. South Africa, for instance, implemented the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP), which has attracted significant foreign investment. Similarly, Kenya's Feed-in-Tariff (FiT) system for renewable energy projects has been lauded as an effective policy mechanism to encourage private sector participation. These examples demonstrate how carefully structured legal instruments can promote energy transition by making renewable energy projects financially viable and reducing investment risk.

However, these models are not without challenges. Raybould et al. (2020) point out that while legal reforms in the UK, South Africa, and Kenya have created pathways for investment, issues such as local content requirements and grid integration continue to slow progress. Uganda, similarly, faces challenges in

aligning its national policies with global best practices due to weak institutional structures and policy incoherence.

### 2.5.2 Uganda's Legal Framework for Energy Transition

Uganda's existing legal framework, as outlined by NAPE (2021), is insufficient to fully support the integration of renewable energy on a large scale. The Electricity Act of 1999 and the Energy Policy for Uganda (2002) provide some regulatory oversight but are not designed to accommodate the complexities of modern renewable energy projects. The Draft Energy Policy (2019) attempts to address these gaps, but as NAPE (2021) highlights, it lacks the enforcement mechanisms needed to compel energy companies to comply with renewable energy mandates. Moreover, Uganda's policies still prioritize fossil fuels, particularly with the government's ongoing investment in oil and gas exploration.

Wawryk (2014) and Choifin (2021) suggest that for Uganda to align with international energy transition efforts, a comprehensive overhaul of its energy laws is required. This would include:

- a. **Establishing Clear Regulatory Frameworks:** Uganda's energy policies must clearly define roles for public and private sector actors, particularly in relation to renewable energy development. This includes establishing transparent and predictable regulations that attract both local and foreign investors.
- b. **Incentivizing Renewable Energy Projects:** Financial incentives, such as feed-in tariffs, tax exemptions, and subsidies, are essential to making renewable energy projects attractive to investors. Uganda has yet to fully implement such incentives at a national level, which has stifled the growth of its renewable energy sector<sup>32</sup>.

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<sup>32</sup> NAPE (n 18)

- c. **Streamlining Permitting and Licensing Processes:** One of the major barriers identified by NAPE (2021) is the bureaucratic complexity involved in obtaining licenses for renewable energy projects. The current system discourages small-scale renewable energy projects due to high upfront costs and lengthy approval times.
- d. **Strengthening Institutional Capacities:** Legal reforms must also address the institutional weaknesses that undermine the enforcement of renewable energy policies. As Wawryk (2014) suggests, governments in developing countries must prioritize building institutional capacities to ensure that the legal framework is effectively implemented.

### **2.5.3 Policy Coherence and Stakeholder Collaboration**

Another critical issue is the need for policy coherence across different sectors. Owusu et al. (2016) and Choifin (2021) both emphasize that energy policy must not only address the technical and economic aspects of renewable energy but also integrate environmental and social considerations. In Uganda, the disjointed nature of sectoral policies—whereby environmental, energy, and economic policies operate in silos—hinders a holistic approach to energy transition.

Collaboration between stakeholders is also crucial. Raybould et al. (2020) show that successful energy transitions in other jurisdictions, such as the UK, were achieved through close collaboration between government, private sector, and civil society. This inclusive approach ensures that the interests of all stakeholders are reflected in the legal reforms. For Uganda, establishing a multi-stakeholder dialogue platform that includes private sector actors, community representatives, and environmental advocacy groups could facilitate better policy development and implementation.

### **2.5.4 Adaptation of International Standards**

As Wawryk (2014) notes, Uganda can learn from international energy law and adapt best practices to its local context. The Paris Agreement and other international frameworks provide Uganda with a roadmap for integrating sustainable energy practices into its legal regime. However, NAPE (2021) argues that Uganda's legal reforms must be more locally tailored to account for its specific socio-economic and environmental challenges, particularly in rural areas where energy access remains low.

For instance, while international frameworks emphasize large-scale renewable projects, Uganda might benefit more from supporting decentralized energy systems, such as mini-grids or off-grid solar systems, which are better suited for rural electrification. These decentralized systems can promote energy access and reduce the burden on the national grid, while also fostering local economic development.

#### **2.5.5 Conclusion**

The literature underscores the importance of a comprehensive legal and policy overhaul to facilitate Uganda's energy transition. While global best practices offer valuable insights, Uganda's unique socio-economic landscape demands tailored solutions. Future legal reforms must prioritize institutional strengthening, policy coherence, and stakeholder collaboration, with a strong focus on incentivizing renewable energy investments. By learning from successful models in other countries and adapting them to local conditions, Uganda can create a legal environment that supports its transition towards sustainable energy.

#### **2.6 Conclusion for Literature Review**

The literature on energy transition, particularly in the context of Uganda and Sub-Saharan Africa, reflects a growing body of work dedicated to understanding the legal, socio-economic, and environmental dimensions of shifting from fossil fuels to renewable energy sources. While global trends in energy transition, as articulated by scholars like Gröbler (1991) and Fouquet

(2016), provide important insights into the broad patterns of energy system evolution, their relevance to the unique challenges faced by developing nations such as Uganda remains underexplored. The research highlights a gap in understanding how legal frameworks in these contexts can facilitate or hinder the transition process.

A critical evaluation of the current legal and regulatory frameworks, particularly as discussed by Irani (2018) and NAPE (2021), underscores the fact that Uganda's energy laws, though comprehensive on paper, lack effective mechanisms for integrating renewable energy into the national grid. The global literature on renewable energy integration, such as that by Owusu et al. (2016), provides valuable lessons from other regions but often overlooks the specific barriers faced by countries with limited financial and technological resources like Uganda. Thus, while global models of energy transition may serve as guiding principles, there is a clear need for localized solutions that address Uganda's socio-economic realities and legal structures.

Moreover, the socio-economic dimensions of energy transition in developing countries are inadequately addressed in existing literature. Studies such as those by Raybould et al. (2020) focus on the broader socio-economic impacts of renewable energy in developed nations, but there is limited scholarship that deeply explores the implications for rural communities in Uganda, where energy poverty remains a critical issue. The failure to incorporate a nuanced understanding of these socio-economic factors within Uganda's legal framework, as highlighted by NAPE (2021), is one of the central barriers to achieving a just and equitable energy transition.

In terms of policy and legal reforms, the literature suggests that countries such as Kenya and South Africa have made significant strides in creating conducive environments for renewable energy investment through legal reforms and government-led initiatives<sup>33</sup>. However, Uganda lags behind in adopting similar measures, and there is limited scholarly focus on how Uganda can reform its

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<sup>33</sup> Choifin (n 26)

legal framework to foster greater investment in renewable energy. Wawryk (2014) provides a comprehensive overview of international energy law but fails to fully address the specific challenges of harmonizing legal frameworks with sustainable development goals in countries with nascent energy sectors like Uganda.

In summary, while the existing literature offers a strong foundation for understanding the global and regional dynamics of energy transition, it falls short in addressing the specific legal and socio-economic challenges that Uganda faces. This study seeks to fill this gap by providing a critical analysis of Uganda's legal framework governing energy transition, with a focus on identifying the barriers and opportunities for integrating renewable energy sources into the national grid. By examining these issues through the lens of both local and international best practices, this research will contribute to the ongoing discourse on how developing countries like Uganda can navigate the complex landscape of energy transition in a manner that promotes both environmental sustainability and economic growth.

### 3 METHODOLOGY

#### 3.1 Introduction

This chapter presents the methodology, the research design, data collection methods, tools, ethical considerations, and limitations of the study. The researcher will use the doctrinal research methodology.

#### 3.2 Doctrinal Research Design

The doctrinal legal research methodology is found to be suitable for this study because it entails critical and systematic analysis of legal propositions to reach rational conclusions.<sup>34</sup> The researcher will adopt the said methodology by analysing the provisions of various governing regulatory and policy frameworks related to energy transitions and upon evaluation will arrive at rational conclusions.<sup>35</sup> The said research method helps reveal the gaps in the law.<sup>36</sup>

#### 3.3 Characteristics of Doctrinal Research Methodology

Doctrinal research is premised on data from authoritative sources, namely statutes, judicial decisions, legal texts and legal commentaries.<sup>37</sup> It focuses on the nature of law and aids in the organised analysis of the statutory provisions.<sup>38</sup>

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<sup>34</sup>S.N. Jain, *Doctrinal and Non-Doctrinal Legal Research*, In *Legal Research and Methodology*, Indian Law Institute, India, 68 (S.K. Verma & M. Afzal Wani Eds., 2006)

<sup>35</sup>Richard Omerod, 'Rational Inference: Deductive, Inductive and Probabilistic Thinking', *Journal of The Operational Research Society* 61 (8)1207-1223 (August, 2020) [www.jstor.org](http://www.jstor.org) Accessed On 27 May, 2021

<sup>36</sup> Vijay M Gawas, 'Doctrinal Legal Research Method a Guiding Principle in Reforming the Law and Legal System Towards Research Development', *International Journal of Law*, (September, 2017) [www.lawjournals.org](http://www.lawjournals.org) Accessed On 25 May, 2021

<sup>37</sup>Kharel A, 'Doctrinal Research' *SSRN Electronic Journal* (January, 2018) [www.researchgate.net](http://www.researchgate.net) Accessed On 26 April, 2021 Pg.10

<sup>38</sup>S.R. Myneni, *Legal Research Methodology*, Published by Allahabad Law Agency, Haryana, 5th Edition 2005, India, At 40

According to Kharel, the ultimate purpose of doctrinal research methodology is to achieve improvement in the law and hence, justice.<sup>39</sup>The tools of doctrinal research include the history of the law, statutes, judicial decisions and case digests.<sup>40</sup>

### 3.4 Data Collection Methods

The researcher will rely primarily on secondary sources of data collection for the study. Emphasis will be placed on substantive law, rules, doctrines, concepts and judicial pronouncements.<sup>41</sup> The researcher will use statutes or enactments, committee reports, legal history and judgements. Most sources shall be textbooks, periodicals and commentaries.<sup>42</sup> The legal scholar will use legal data gathered from case laws, legislation, law journals and articles, law reform reports, parliamentary materials, policy documents, textbooks and online materials that are relevant to the area of study. The researcher will make his research based on secondary data which is relevant to his proposition.<sup>43</sup>

The researcher will employ a multifaceted approach to gather comprehensive insights. In addition to relying on secondary sources, the study will introduce a structured questionnaire designed to capture the perspectives of legal experts, policymakers, and stakeholders actively engaged in the energy transition landscape. This questionnaire is carefully crafted to align with the research objectives, aims to extract nuanced insights and opinions, thereby

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<sup>39</sup>Kharel (n 37)

<sup>40</sup>Gawas (n 36)

<sup>41</sup>Rattan Singh, *Legal Research Methodology*, Published by LexisNexis, 1st Edition 2013, India, At 148

<sup>42</sup>S.R. Myneni, *Legal Research Methodology*, Published by Allahabad Law Agency, Haryana, 5th Edition 2005, India, At 40

<sup>43</sup>Ibid

complementing the doctrinal research methodology. Furthermore, interviews may be conducted, guided by a thoughtful interview guide, to delve deeper into specific legal propositions and policy frameworks related to energy transitions.

The choice of these instruments is strategic, seeking to not only analyse established legal sources but also to capture qualitative insights that may not be readily apparent in the doctrinal analysis.

### **3.5 Data Collection Tools**

Since doctrinal legal research methodology analyses secondary sources, in this study the researcher will rely on a variety of data found in the library and online relevant sources. These consist of books, journal articles, statutory materials, legal history, judgements, case reports and digest, and reports of committees which will all be relevant to the topic in question.

#### **3.5.1 Research Instruments**

The research will employ multiple instruments to effectively gather comprehensive data. These instruments include:

- **Structured Questionnaires:** These will be designed to elicit specific responses from targeted individuals within the relevant governmental bodies and ministries. The questionnaire will encompass inquiries aimed at understanding perceptions, opinions and insights concerning sustainable energy practices in Uganda.
- **Semi-Structured Interviews:** To obtain more nuanced and detailed information, interviews will be conducted with key officials from the

Ministry of Energy and Mineral Development, Ministry of Finance, Bank of Uganda, and the Parliament of Uganda. These interviews provide qualitative insights into policy decisions and their impact on environmental and economic sustainability.

- **Review Checklists:** A comprehensive checklist will be developed to systematically analyse statutes, legal texts, case laws, and scholarly articles related to energy transitions and their legal implications. This checklist will aid in organizing and synthesizing information extracted from various sources.

### 3.6 Target Population

This research aims to explore the legal framework surrounding sustainable energy practices in Uganda, with a specific focus on its application to promote environmental and economic sustainability. The study will collaborate with pertinent governmental bodies and ministries in Uganda responsible for energy-related policymaking, as their decisions significantly influence the nation's environmental and economic welfare, particularly in projects requiring substantial funding. The intended research participants include the Ministry of Energy and Mineral Development, which oversees energy-related projects, the Ministry of Finance, entrusted with project financing approvals, the Bank of Uganda, a critical player in ensuring financial viability, and the Parliament of Uganda, the legislative body responsible for policy enactment and other private sector players. These institutions hold valuable insights that are instrumental in achieving the research's objective of assessing the legal

framework's effectiveness in fostering sustainable energy practices and contributing to the country's environmental and economic sustainability goals.

### **3.7 Sample and its Determination**

The sample size will be determined by requirements that are relevant to the topic at hand. The officials accountable for the important concerns that are critical to the research's success and upbringing will be the targeted population as mentioned earlier. Because sampling allows for a higher level of confidence while looking for findings, it will be used.

### **3.8 Sampling Techniques**

Because researching the whole population is challenging, sampling is essential. The process of selecting a proper sample, or a representative fraction of a population to determine parameters or characteristics of the entire population is known as sampling. To conduct this study, purposeful sampling will be employed as a sampling technique. Sampling helps classify information that is useful for a more in-depth investigation and also entails locating and selecting individuals who are knowledgeable about or have experience with the chosen issue. In addition, convenience sampling will be used in the study. This sampling method entails locating and selecting respondents based on their availability for the study.

### **3.9 Qualitative data analysis**

The qualitative data analysis in this study will adhere to an interpretative philosophy, focusing on the symbolic and meaningful substance inherent in qualitative data. Specifically, the analysis will adopt a thematic approach,

aiming to identify and explore recurring themes that emerge from interviews and questionnaire responses. This method aligns with the grounded theory framework, allowing for the inductive development of insights based on the collected qualitative data.

The thematic analysis process involves a careful identification of patterns and meanings within the data. For instance, when analysing interview data, the researcher will seek to determine individuals' perceptions of the world, the underlying reasons for those viewpoints, the process through which they arrived at those viewpoints, and their actions in light of those perspectives. This approach ensures a robust and nuanced qualitative analysis, contributing to a more profound understanding of the legal landscape surrounding sustainable energy practices in Uganda.

### **3.10 Ethical considerations**

In this study, the researcher must make certain that all of the literature to be examined is given with accurate citations to the authors.

The purpose of ethics in this study is to ensure that no one is hurt or suffers negative effects as a result of the research. The researchers' goal will be to preserve the respondents' rights by; ensuring that no respondents are identified during the study or subsequent thesis, ensuring that respondents are chosen without bias to participate, therefore giving respondents confidence. By collecting an introductory letter, the researcher will also attempt to tell the respondents about the rationale and goals of the research. Furthermore, the researcher will be able to advise the respondents that permission from the company's management was obtained before the start of the research project.

## **4 LEGAL AND NON-LEGAL CONSIDERATIONS IN NAVIGATING UGANDA'S ENERGY TRANSITION TOWARDS ENVIRONMENTAL AND ECONOMIC SUSTAINABILITY**

This chapter explores the multifaceted landscape of Uganda's energy transition from traditional sources to more sustainable alternatives. By examining both legal and non-legal aspects, this topic aims to elucidate the complexities and opportunities inherent in navigating Uganda's energy transition towards a more sustainable future.

### **4.1 Energy Law and Policies in Uganda; A Legal Frame Work Analysis**

In a bid to attain the sustainable development goal (SDG)<sup>7</sup> of access to affordable, reliable, sustainable and modern energy, Uganda has developed a strong legal and institutional framework to ensure adequate, reliable and low-cost power supply to meet the country's demand, promote the efficient operation of the power sector and scale up rural and semi-urban access to maximize the impact on poverty reduction.

The energy sector in Uganda is governed by a myriad of laws and policies aimed at promoting energy development while balancing environmental sustainability and economic growth. This section provides a critical analysis of the legal framework governing energy in Uganda, focusing on how these laws align with the global push for energy transition and sustainability. Rather than merely outlining the existing laws, this section evaluates their effectiveness in fostering renewable energy adoption and addressing challenges inherent in the energy transition process. The analysis will also assess whether Uganda's legal framework is sufficiently robust to mitigate environmental impacts and

promote long-term economic growth, particularly in light of international obligations such as the Paris Agreement.

#### **4.1.1 The Constitution of the Republic of Uganda 1995 (As Amended)**

The Constitution recognizes the relationship between the protection of the environment and sustainable development.

*National Objectives and Directive Principles of State Policy under Objective XXVII on the environment requires the State to promote sustainable development and public awareness of the need to manage land, air and water resources in a balanced and sustainable manner for the present and future generations<sup>44</sup>. It further duty bounds the state to promote the rational use of natural resources so as to safeguard and protect the biodiversity<sup>45</sup>The same emphasis is provided under Article 245 of the constitution which requires the parliament to pass such laws that are intended to manage the environment for sustainable development<sup>46</sup>.The state is also duty bound to protect important natural resources, including, water, wetlands, minerals, oil, fauna and flora<sup>47</sup>.In the same spirit, the state is further duty bound to promote and implement energy policies that will ensure that people's basic needs and those of environmental preservation are met<sup>48</sup>*

As a result of this mandate, laws and policies have been passed and implemented to regulate the energy sector.

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<sup>44</sup> Objective Xxvii Of National Objectives and Directive Principles of State Policy

<sup>45</sup> Ibid Xxvii (B)

<sup>46</sup>Article 245 Of the Constitution of The Republic of Uganda

<sup>47</sup>Objective Xiii Of National Objectives and Directive Principles of State Policy

<sup>48</sup>Ibid Xxvii (Iii)

#### **4.1.2 The Electricity Act, 1999**

Electricity is a public good and its access and utilization by Ugandans is a right that should be recognized and protected at whatever cost. Electricity access is crucial for the socio-economic development of the country and in order to improve the electricity sector , the Electricity Act was enacted to liberalise and regulate the electricity sector as well as provide for rural electrification.

Section 4 of the Act establishes the Electricity Regulatory Authority (ERA) to regulate the industry. The primary objective of the Act was to liberalize the electricity sector. The Act disbanded Uganda Electricity Board (UEB) (historically a vertically integrated monopoly) into three entities namely Uganda Electricity Generation Company Ltd (UEGCL), Uganda Electricity Distribution Comapany Ltd (UEDCL) and Uganda Electricity Transmission Comapany Ltd (UETCL) as a move to foster competition and increase investment in the sector through greater private sector participation. It also provided for the establishment of the Rural Electrification Fund (REF), with the main objective of enhancing rural access to electricity and the Electricity Disputes Tribunal (EDT) that has jurisdiction to hear and determine electricity sector disputes which are referred to it.

#### **4.1.3 The Atomic Energy Act (2008)**

This Act provides for the promotion and development of nuclear energy for use in power generation and other peaceful purposes. The Act further establishes the Atomic Energy Council to regulate the peaceful applications of ionising radiation.

#### **4.1.4 Bio Fuels Act (2018)**

This Act regulates the production, storage and transportation of bio fuels and blending of bio fuels with petroleum products. It permits the usage of surplus food grains for the production of ethanol to be used for blending with petrol

#### **4.1.5 The Energy Policy for Uganda, 2002**

The Government of Uganda formulated and implemented the Energy Policy for Uganda 2002 as the primary guiding document for the country's energy sector. The main objectives of the policy were to establish the availability, potential and demand of the various energy resources in the country, increase access to modern affordable and reliable energy services, improve energy governance and administration, stimulate economic development, manage energy-related environmental impacts among others.

The government made significant achievements on the objectives set out in the Policy. These include; increased electricity generation capacity from 317 MW (2002) to 1,182 MW (May 2019) resulting in a supply/demand surplus, increased electricity access from 5% (2002) to 28% (2019), reduction in electricity losses from over 35% (2000) to 17.4% (2017), dominance of renewable energy in the national energy mix; enabling environment for private sector investments, increased energy sector contribution to the national GDP, increased efficiency initiatives in the biomass subsector, liberalization and improved sector regulation among others.

#### **4.1.6 The Draft Energy Policy for Uganda 2019**

The government is in the process of revising the Energy Policy for Uganda of 2002. The revised Energy Policy aims to consolidate the achievements of the

Energy Policy for Uganda 2002, align the policy framework with recent international, regional and national developments and commitments and ensure that the government is well-positioned to address the new and emerging socio-economic challenges of the energy sector in the coming decade. The Policy aims to have a stronger focus on gender and climate change mainstreaming in sector activities.

The Policy seeks to cover subsectors like renewable energy, clean cooking, electrical power, rural electrification and access, energy efficiency and conservation, nuclear energy and selected cross cutting issues.

The policy is to consider the efforts that are still required to achieve the targets of Sustainable Development Goals (SDGs) and Vision 2040.

#### **4.1.7 The Renewable Energy Policy (2007)**

This Policy aims to increase the share of renewable energy in the national energy mix. The policy seeks to develop Solar PV, Bio Energy, Bio Fuels, Geothermal as well as Biomass for power generation.

The Government of Uganda's policy vision for Renewable Energy is: *To make modern renewable energy a substantial part of the national energy consumption*<sup>49</sup>.

The Overall Policy Goal is: *To increase the use of modern renewable energy, from the current 4% to 61% of the total energy consumption by the year 2017*<sup>50</sup>

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<sup>49</sup>The Renewable Energy Policy for Uganda (2007)

<sup>50</sup>Ibid

The Renewable Energy Policy follows the commitment in the National Energy Policy 2002 to develop the use of renewable energy resources in Uganda. The Government's overarching policy vision for renewable energy is to make modern renewable energy a substantial part of national energy consumption, where modern renewable energy is understood to mean renewable energy resources that are transformed into modern energy services like electricity.

To achieve its goal, a number of supporting objectives are identified. These include: maintaining and improving the responsiveness of the legal and institutional framework to promote renewable energy investments; establishing financing and fiscal policy framework for investments in renewable energy; increasing public awareness in renewable energy and promoting investment in this area; promoting research and development as well as international co-operation in renewable energy technologies (RETs); utilizing biomass energy efficiently and sustainably; and promoting the conversion of municipal and industrial waste to energy.

Various strategies and policy actions are elaborated in order to achieve these objectives. A power generation programme will support public and private sector investments in renewable energy, focusing on large hydropower schemes (hydropower being the most well-developed RET) as well as small and more diverse schemes. A rural and urban-poor electricity access programme will support the development of RETs in dispersed and remote settlements. A modern energy services programme will support RETs such as solar PV and solar water heaters, a bio fuels programme will support improvements in bio fuel technology, and a waste for energy programmes will support the conversion of

waste to energy. An energy efficiency programmes will implement the Uganda Energy Efficiency Strategy.

The responsibility for the policy lies with the Ministry of Energy and Mineral Development and a Renewable Energy Department is to be developed within the Ministry. Moreover, a special financial mechanism, a credit support facility known as the Uganda Energy Capitalization Trust, is instituted to help realise the policy. The ultimate goal of the Renewable Energy Policy is to increase the use of modern renewable energy, from the current 4% to 61% of the total energy consumption by the year 2017.

Uganda has considerable renewable energy resources for energy production and the provision of energy services<sup>51</sup>, yet they remain unexploited, largely due to the perceived technical and financial risks. This limits the scope and productivity of economic activities that can be undertaken in any part of the country. Thus, it is imperative that the use of these abundant resources should be enhanced.

Recently completed studies gave the potential as indicated below. The Renewable Energy Power Potential<sup>52</sup>:-

Table 2.1: Uganda's Renewable Power Potential

<b>Energy Source</b>	<b>Estimated Electrical Potential (MW)</b>
Hydro	2,000

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<sup>51</sup>The Renewable Energy Policy for Uganda (2007)

<sup>52</sup>Alternative Energy Sources Assessment Report, 2004, National Biomass Assessment Study 2003

Mini-hydro	200
Solar	200
Biomass	1,650
Geothermal	450
Peat	800
Wind	-
TOTAL	5,300

Figure 1: Source: Alternative Energy Sources Assessment Report, 2023

To achieve above targets, the REP first supports large-scale hydro projects, through the implementation of Public Private Partnerships and the negotiation of project-by-project energy purchasing tariffs. It further created a Ugandan Feed-In-tariff<sup>53</sup> to support small-scale renewable projects and local Individual Power Producers. To further attract private investors, the government will secure stable Standardized Power Purchase Agreements.

#### 4.1.8 The Electricity Connections Policy (2018)

The Government of Uganda has formulated the Electricity Connection Policy (ECP) for a period of 10 years starting from 2018 to 2027. The primary objective of the policy is to increase electricity access and provide cleaner energy for Ugandans. The policy aims at addressing the major obstacles that hinder increasing electricity access in Uganda. Electricity access targets as

<sup>53</sup>Electricity Regulatory Authority: Uganda Renewable Energy Feed-In Tariff (Refit) Phase 2 Guidelines. Accessed 23<sup>rd</sup> December 2021

spelt out in the government major development plans are to be achieved under the ECP. The ECP will initially aim at achieving the 26% rural access target by 2022 as set out in the Second Rural Electrification Strategy and Plan (RESP II) with 30% national coverage target by 2020 set out in the Second National Development Plan (NDP II). The ECP will also aim at accelerating access after 2020 in order to achieve 60% access rate by the year 2027, after which it will be revised to enable achievement of the 80% Vision 2040 connection target and thereafter universal coverage<sup>54</sup>. The 60% target is a minimum and may be surpassed as more funding becomes available. The policy has taken into consideration customers to be connected on the grid and off the grid. On the grid connection target is 67% and 33% shall be off grid in line with projections under the Sustainable Energy for All Action Agenda.

Other notable renewable energy policies include the Climate Change Policy (2015) and the Environmental and Social safe Guards Policy(2015)”.

#### **4.1.9 Conclusion**

The legal framework governing Uganda’s energy sector is comprehensive but remains insufficiently aligned with the imperatives of a sustainable energy transition. While laws like the Electricity Act of 1999 and the Renewable Energy Policy (2007) provide a foundation for promoting renewable energy, their practical implementation has been limited by regulatory inefficiencies and a lack of enforcement mechanisms. Moreover, the frameworks have yet to fully incorporate international best practices regarding climate change and sustainable development. Therefore, while Uganda has made strides in

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<sup>54</sup>Ministry Of Energy and Mineral Development (2018 – 2027): *Electricity Connection Policy- Financing and Implementation for Connections*. Period 2018 – 2027

establishing an energy law regime, significant gaps remain in ensuring that this framework effectively supports the country's energy transition goals.

## **4.2 Renewable Energy Law**

Renewable energy law is a critical component of Uganda's efforts to transition towards sustainable energy sources. This section explores the current legal provisions that support the development and utilization of renewable energy technologies such as solar, wind, and hydroelectric power. This analysis evaluates how these laws facilitate or hinder renewable energy adoption in Uganda. Special attention is given to the adequacy of legal incentives and barriers to investment, particularly in light of Uganda's commitment to international climate change agreements.

Renewable energy law is a particular kind of energy law that relates primarily to the transactional, legal and policy issues surrounding the development, implementation, and commercialization of renewable source of energy, such as solar, wind, geothermal and tidal. Renewable Energy (RE) law also relates to the land use, siting and finance issues encountered by developers of renewable energy projects.

Renewable energy law also encompasses policies that relate to renewable energy and legislative instruments that further encourage its growth.

One such form of legislation is feed-in tariffs, which provide economic incentives to the developers of renewable energy projects by setting a fixed price for the sale of energy produced from renewable sources. Feed-in tariff laws also provide financial certainty, are more cost effective and less bureaucratic than other support schemes such as investment or production tax

credits, quota based renewable portfolio standards (RPS), and auction mechanisms<sup>55</sup>. In addition, the feed-in tariff generates more competition, more jobs, and more rapid deployment for manufacturing; it also does not pick technological winners, for instance between more mature wind power technology versus solar photovoltaic technology<sup>56</sup>.

The role of the sector regulator is specified in the enabling legislation. For example, regulatory oversight of feed-in tariff programs is essential, whether the price is based on a predetermined number (and with some maximum capacity), an auction/bidding process, or avoided cost. In each case, the regulator monitors activities to ensure abuses do not arise. How external (environmental and health) costs are factored into program evaluation is partly dependent on the enabling legislation (or executive order). If the law establishes Renewable Portfolio Standards, the energy regulator will need to oversee the system and evaluate its effectiveness in meeting RE objectives. Generally, some other agency is responsible for certifying the generators and handling the certification system.

In conclusion, Uganda's renewable energy laws provide a framework for encouraging investment in clean energy technologies. However, their impact on actual energy transition remains limited due to inconsistent policy implementation and inadequate financial incentives. The Renewable Energy Policy (2007) and related regulations have had some success in promoting solar and hydroelectric projects, but gaps in regulatory enforcement and

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<sup>55</sup>Butler &Neuhoff, "*Competitive Auction Mechanisms for The Promotion Renewable Energy Technologies: The Case of the 50 Mw Photovoltaics Projects in Cyprus*". Angelikikylili, Paris A. Fokaides (2008)

<sup>56</sup>Morris, *Renewable and Sustainable Energy Review* 42 2007 Pp.226–233. <Doi:10.1016/J.Rser.2014.10.022 Accessed 30 December 2021

infrastructure development continue to hinder large-scale renewable energy adoption. Therefore, for Uganda to achieve its energy transition targets, more aggressive legal reforms and stronger implementation strategies are needed.

### **4.3 Renewable Energy Support Laws**

Renewable energy support laws, such as Feed-in-Tariffs and Renewable Portfolio Standards, are designed to promote the integration of clean energy technologies into the national grid. This section critically examines the effectiveness of these legal mechanisms in Uganda, focusing on their ability to drive investment and foster the growth of renewable energy markets. The analysis also considers whether these laws are sufficient to overcome the socio-economic challenges associated with the energy transition, such as affordability and accessibility.

#### **4.3.1 Feed-in-Tariffs**

One such form of legislation is feed - in - tariffs (FIT), which provide economic incentives to the developers of renewable energy projects by setting a fixed price for the sale of energy produced from renewable sources<sup>57</sup>. Feed-in tariff laws also provide financial certainty, are more cost effective and less bureaucratic than other support schemes such as investment or production tax credits, quota based renewable portfolio standards (RPS), and auction mechanisms.

#### **4.3.2 Renewable Portfolio Standards**

This type of law is in force in 37 of the States within the United States, as well as Australia and a minority of European nations. It works by fixing the

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<sup>57</sup>Uganda Renewable Energy Feed-In Tariff (Refit) Phase 2 guidelines: Revised 15th November 2012

quantity of renewable electricity that must be produced, and leaving it to the market at what price this extra renewable electricity will be produced. This form of legislation typically employs a trade-able certificates mechanism, where 1 Megawatt Hour of electricity is equivalent to 1 renewable energy certificate.

#### **4.3.3 Auctions and Tenders**

This form of renewable energy incentive is established by legislation and regulations and is increasingly popular throughout the world as a policy choice for governments. The details of the auction need to be carefully designed to prevent sub-optimal outcomes.

#### **4.3.4 Conclusion**

While renewable energy support laws like Feed-in-Tariffs have had a positive impact on promoting small-scale renewable energy projects, their overall effectiveness in driving large-scale energy transition in Uganda is limited. Issues such as the high cost of renewable energy technologies and insufficient government subsidies continue to deter wider adoption. Moreover, the lack of a comprehensive legal framework to regulate and incentivize large-scale renewable projects points to the need for more targeted reforms in Uganda's renewable energy support laws.

#### **4.4 Renewable Energy Laws by Technology**

Different renewable energy technologies, including hydroelectric, geothermal, wind, and solar energy, are subject to distinct legal frameworks in Uganda. This section critically evaluates the effectiveness of these technology-specific laws, assessing their capacity to meet Uganda's energy transition objectives.

By focusing on how these laws have been implemented in practice, the analysis will highlight both the successes and shortcomings in advancing renewable energy development.

#### **4.4.1 Hydroelectric Energy**

Small-scale hydropower exploits the potential of falling water, converting it into mechanical power by flowing water through a turbine and generating electrical energy by means of a generator. A micro-hydropower system is generally classified as having a generating capacity of less than 100kW. A pico-hydropower system is generally classified as a system that has a generating capacity of less than 1kW. Micro-hydro systems generally have the following components: A water turbine that converts the energy of flowing or falling water into mechanical energy that drives an electrical generator; A control mechanism to provide stable electrical power; and Electrical transmission lines and grid connection equipment to deliver the power to the user

The potential of hydropower is huge in Uganda. Irrespective of the size of installation, any hydropower development requires authorisation in terms of the National Water Act 2003<sup>58</sup>. Furthermore, pressure regarding the environmental impact and displacement of settlements by large storage dams may limit the exploitation of hydropower on a large scale.

Conventional hydroelectric dams in most countries are highly regulated, with environmental reviews before construction and operational limits afterwards.

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<sup>58</sup>Ministry Of Water and Environment: Sector Strategic Plan for Statistics (MWE-SSPS) 2007/2008-2011/12

Operation normally places river conditions before power interest, i.e. power generation may not be needed at night while rivers are kept flowing. Impact mitigation of hydro power projects triggers the need for Basic Assessment (BA) or an Environmental Impact Assessment (EIA) under the EIA regulations. In addition to the assessment process is the preparation of an Environmental Management Programme (EMPr). Project-specific measures designed to mitigate negative impacts and enhance positive impacts should be informed by good industry practice and are to be included in the EMPr. An independent environmental assessment practitioner will be employed by the applicant to prepare the BA, EIA , and EMPr to applicable standards. Potential mitigation measures for hydropower energy projects include, but are not limited to; Conduct pre-disturbance surveys as appropriate to assess presence of sensitive areas, fauna, flora and sensitive habitats; protect wetlands and watercourses as applicable by avoiding or protecting them; minimise erosion and sediment loading; minimise stream crossings and reduce stream bank cutting to reduce erosion and reduction in aquatic habitat quality; develop and implement a spill management plan; plan re-vegetation with appropriate indigenous plants to prevent erosion introduction of alien species; trash rack design to minimise entrapment of fish and other aquatic species at intake points; fence sites as appropriate to ensure safe restricted access; and ensure adequate continuous bypass flow through natural water channels.

#### **4.4.2 Geothermal Energy**

A number of laws, regulations and executive orders apply to geothermal energy development activities

Geothermal energy is one of the possible alternative renewable energy sources in Uganda, which will supplement other sources of energy. Its major advantages are that it is environmentally friendly and multidisciplinary in uses, since it can support various development activities ranging from production to processing of raw materials, like minerals and agricultural produce. Geothermal investigations in Uganda have so far identified three potential areas for detailed exploration<sup>59</sup>. They are all situated in western Uganda, in the western branch of the East African Rift Valley. The three potential areas are Katwe-Kikorongo, Buranga and Kibiro. Based on recent assessments, they have all been ranked as potential targets for geothermal development. The total geothermal energy potential is estimated at 450 MW<sup>60</sup>.

Current efforts by Government are focused on developing the above three areas to a prefeasibility stage, which would pave way for availing required data for the feasibility study. The pre-feasibility study will involve drilling of deep exploration wells, which will provide information on reservoir temperature, fluid chemistry and other petrophysical parameters. The current study results indicate that the temperature level varies between 150 C° and 200 C°. Further studies are being carried out countrywide to generate further potential geothermal sites. These geothermal areas will then be ranked.

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<sup>59</sup>The Renewable Energy Policy for Uganda, 2007

<sup>60</sup>Ibid

#### 4.4.3 Wind Energy

Onshore wind energy technology is the most commonly used and commercially developed renewable energy technology. Wind turbines are used to generate energy and they produce power over a wide range of wind speeds. Essentially, the turbine blades are designed to capture the kinetic energy in wind. When the turbine blades capture wind energy and start moving, they spin a shaft that leads from the hub of the rotor to a generator. The generator turns that rotational energy into electricity.

Wind power generates electricity without releasing toxic pollution or CO<sub>2</sub> emissions. Wind is abundant and inexhaustible. At the same time, however, the construction and operation of wind turbines may possibly lead to unfavourable environmental impacts on biodiversity, land-use and communities in the form of noise and visual impacts. In addition to species disturbance and mortality, the issues of habitat loss and fragmentation needs to be considered for all affected living organisms inclusive of plants, invertebrates and vertebrates including birds and bats. Potential impacts from wind energy installations must therefore be assessed and mitigated when necessary. The National Environmental Management Act, 2019 defines environmental impact assessment (EIA) as the procedure which ensures that impacts of projects are identified and assessed before authorisation is considered. The main objective is to avoid or minimise negative effects from the beginning of a project rather than trying to mitigate them later.

Wind speed is moderate in most areas of Uganda. Based on wind data collected by the Meteorology Department, it was concluded that the wind energy

resource in Uganda, is sufficient for small scale electricity generation and for special applications, such as water pumping mainly in the Karamoja region. More recently, low speed turbines have been developed and they have proved effective for power generation. Recent studies also confirm that electricity generation through wind is feasible, especially for small industries or in rural areas where targets for a mill range from 2.5 kV to 10 kV<sup>61</sup>.

#### **4.4.4 Solar Energy**

South Africa experiences some of the highest levels of solar radiation in the world (between 4.5 and 6.5kWh/m<sup>2</sup>) and therefore, possesses considerable solar resource potential for solar water heating applications, solar photovoltaic and concentrated solar power (CSP) generation. The potential uses and applications include: Active solar thermal water heating for domestic, commercial and industrial applications. This is considered a Demand Side Management intervention and is excluded from the scope of this guideline; Electricity (photovoltaic and solar thermal) generation, ranging from small/medium-scale stand-alone applications to large-scale grid-connected applications; and Solar/Heat Pump hybrid systems for water heating, space heating and cooling.

There also exists significant potential for solar passive building design practice for residential, commercial and industrial buildings to minimise thermal energy consumed. Furthermore, solar cookers have been demonstrated as an alternative to cooking with fuel-wood in rural areas throughout the continent.

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<sup>61</sup> Ibid

Photovoltaic (PV) systems are widely applied in South Africa for powering professional niche applications such as telecommunications, microwave links, navigational aids and meteorology stations, where PV is well established as the best practical option. PV is also applied in small-scale remote power supplies for domestic use, game farms and community water pumping schemes.

PV cells are made from semi-conductor materials that are able to release electrons when exposed to solar radiation by using the photo-electric effect. Electrons from several PV cells are gathered together through conductors to make up the generation capacity of one module and many modules can be connected together to produce power in large quantities. Internationally, PV is the fastest-growing power generation technology and between 2000 and 2009 the installed capacity globally grew on average by 60% per year. Worldwide more than 35GW of PVs are installed and operating, and in South Africa as much as 8GW PV could potentially be installed by 2020.

Concentrated solar power (also called concentrating solar power, concentrated solar thermal or CSP) systems use mirrors or lenses to concentrate a large area of sunlight, or solar thermal energy, onto a small area. Electrical power is produced when the concentrated light is converted to heat, which drives a heat engine, usually a steam turbine, connected to an electrical power generator. The minimum Direct Normal Radiation (DNR) to justify a CSP plant is 1,800 kWh/m<sup>2</sup> per year. According to the South African RRDB, the area exceeding the minimum required DNR in South Africa covers approximately 194,000km<sup>2</sup>. The 2003 Renewable Energy White Paper

calculates that South Africa may have a CSP potential of some 65GW, capable of providing 36,000 GWh/year.

Existing solar data clearly show that the solar energy resource in Uganda is high throughout the year. The mean solar radiation is 5.1 kWh/m<sup>2</sup> per day, on a horizontal surface. This level of insolation is quite favourable, for the application of a number of solar technologies. These include solar water heating and solar photovoltaic systems for supply of basic electricity in rural institutions and households as well as areas not connected to the grid. The total new installed photovoltaic capacity annually is estimated at 200 kWp for households, institutions and commercial use. Solar thermal has a great potential in the form of solar water heaters in electrified areas.

Today electricity is most often used for water heating, in spite of the fact that it will in many cases be cheaper for the consumer to use solar energy. Furthermore, small solar water heaters are relevant for remote areas, where hot water is needed like in rural clinics and tourism areas, to provide a cheap, reliable and environmentally friendly, source of energy.

Solar technology can also be used for power generation; however, the prohibitive costs make it less favourable than other sources of power generation.

a. *Environmental Impacts of Solar energy*

The potential environmental impacts associated with solar power (land use and habitat loss, water use, and the use of hazardous materials in manufacturing) vary greatly depending on the technology to be used. In broad terms the range of potential impacts could include:

- Land use: Depending on their location, larger utility-scale solar facilities can raise concerns about land degradation and habitat loss. Total land area requirements estimate for utility-scale PV systems range from 1.5 to 4 hectares per megawatt, while estimates for CSP facilities are between 0.65 and 2.7 ha per megawatt<sup>62</sup>;
- Water use: Solar PV cells do not use water for generating electricity. However, as in all manufacturing processes, some water is used to manufacture solar PV components. CSP in common with all thermal electric plants, require water for cooling. Water use depends on the plant design, plant location, and the type of cooling system;
- Hazardous materials: The PV cell manufacturing process includes a number of hazardous materials, most of which are used to clean and purify the semiconductor surface. These chemicals (similar to those used in the general semiconductor industry) include hydrochloric acid, sulphuric acid, nitric acid, hydrogen fluoride, trichloroethane, and acetone. The amount and type of chemicals used depends on the type of cell, the amount of cleaning that is needed, and the size of silicon wafer<sup>63</sup> and,
- Other impacts in terms of noise, visual issues, electromagnetic and aircraft interference.

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<sup>62</sup> [www.ucsusa.org](http://www.ucsusa.org)

<sup>63</sup>Department Of Environmental Affairs (2015): EIA Guideline for Renewable Energy Projects. Department Of Environmental Affairs, Pretoria, South Africa

#### 4.4.5 Residual Biomass & Bio fuels

Residual biomass energy is generally derived from renewable sources of organic matter and can be used to provide heat, make liquid fuels (Bio-fuels) or to generate electricity. The types of biomasses include plants, residues from agriculture or forestry, and organic components in municipal and industrial wastes<sup>64</sup>.

Bio-fuels in liquid form are produced from the conversion of biomass and when correctly utilised, can be substituted for fossil-fuel derived fuel oils. Typical applications include transportation use and the generation of power via internal combustion engines. The two most commonly encountered bio-fuels are bio-ethanol and bio-diesel. Bio-ethanol is produced through a fermentation process, whereas bio-diesel is manufactured using the chemical reactions trans-esterification and esterification. The bio-diesel manufacturing process involves vegetable or animal fats and oils being reacted with short-chain alcohols (typically methanol or ethanol).

Biogases are a sub-category of residual biomass derived from the remains of sorghum and sugarcane, and is proven to be a good renewable alternative for producing electrical power and heat. In South Africa bagasse is extensively used within the sugar-milling industry to generate process power and heat. The mills use the sugar and juices for their products and then retain the crushed stalks which are then stored in wet conditions. Because of the decomposition of the stalks, the pile starts to dry and becomes highly

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<sup>64</sup> <http://www.altenergy.org/Renewables/Biomass.html>

combustible and ready for burning. For every 100 tonnes of sugar cane harvested and milled, 10 tonnes of sugar are produced together with some 28 tonnes of solid waste in the form of bagasse. Typically, the mill uses a portion of the biogases in a low efficiency steam cycle to produce the electricity and steam which it needs for its own use.

With sugar mills currently generating a significant amount of power for own use and even limited export, biogases offer some of the best potential for IPPs in South Africa using renewable resources. It is estimated that an energy conversion rate of 120kWh/ton can be achieved using conventional steam plants running at higher pressures. Using integrated combined cycle combustion technologies, the yield per ton of biogases can be increased to 200kWh/ton. Purely through increased efficiency and new technologies the potential of this resource can be increased from the current 210GWh to 1 400GWh per annum<sup>65</sup>

#### **4.4.6 Energy from Waste (Landfill Gas)**

As waste in landfills decomposes, different gases are continuously produced in varying proportions. Landfill gas (LFG) comprises approximately 50% CH<sub>4</sub>, 40% CO<sub>2</sub>, small quantities of oxygen and nitrogen, and over 100 other trace gases, including CO and H<sub>2</sub>S. Whilst CO<sub>2</sub> is found in much greater quantities in the atmosphere, CH<sub>4</sub> is a potent greenhouse gas that is a key contributor to global climate change (over 21 times more potent than CO<sub>2</sub>). In addition, typical LFG if permitted to accumulate in low lying or enclosed or confined

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<sup>65</sup>2003 Renewable Energy White Paper: Department of Environmental Affairs (2015): EIA Guideline for Renewable Energy Projects. Department Of Environmental Affairs, Pretoria, South Africa

spaces (such as buildings and houses next to a landfill), may produce an atmosphere that is both explosive and hazardous to life.

The extraction of LFG can take place once landfill cells reach capacity, at which point the landfill is covered, extraction equipment and collection pipe networks set in place, and the process of extracting the LFG can begin. In addition, the installation of LFG extraction systems can be incorporated in the landfilling process, enabling the extraction of LFG much earlier and prior to the completion of individual landfill cells. LFG is converted into electricity through the following process: LFG is extracted from the landfill via extraction wells and a centrifugal blower; Gas collection pipes collect and transport the LFG from the wells to an extraction plant; at the extraction plant the LFG is burned. The burning of the CH<sub>4</sub> component drives a generator that produces electricity. Any surplus is flared via flare units; and the resulting electricity is then fed into the regional grid.

#### **4.4.7 Biogas**

Biogas typically refers to the gas which is produced by the biological breakdown of organic matter. Organic waste-streams such as animal manure and municipal wastewater (sewerage) can be converted into biogas using anaerobic digestion systems. Biogas consists mainly of CH<sub>4</sub> and CO<sub>2</sub>. Biogas can be used as fuel for cooking, lighting, water heating as well as being able to run biogas generators to produce electricity.

In industrialised countries, power generation is the main purpose of biogas plants where the conversion of biogas to electricity has become a standard technology. In most cases, biogas is used as a fuel for combustion engines

linked to a standard power generation arrangement. Frequently the waste heat from the engine cooling system is utilised within the digester or another local heat-sink.

For use within gas or diesel engines, biogas must fulfil certain requirements. The methane content should be as high as possible as this is the main combustible part of the gas; The water vapour and CO<sub>2</sub> content should be as low as possible, as they reduce calorific value of the gas; and the sulphur content (mainly in form of H<sub>2</sub>S) must be low as it is converted to corrosion-causing acids by condensation and combustion. The percentage of hydrogen sulphide content in the biogas can be addressed via a range of gas scrubbing methods.

#### **4.4.8 Conclusion**

The laws governing renewable energy technologies in Uganda provide a basic framework for their development but fall short of addressing the nuanced challenges associated with each technology. For instance, while the Electricity Act, 1999 supports large-scale hydro projects, it does little to incentivize smaller, decentralized renewable projects, such as solar and wind. Moreover, there is a notable absence of legal frameworks to promote emerging technologies like geothermal and wind energy. To advance Uganda's energy transition, it is essential to adopt a more flexible, technology-specific legal approach that encourages innovation and addresses the unique challenges of each renewable energy source.

#### **4.5 Energy Sector Institutions and Agencies**

The Ministry of Energy and Mineral Development oversees the regulatory institutions that in turn supervise the government and independent providers in the sector. The Ministry provides overall policy direction and guidance in the development and exploitation of energy, mineral, oil and gas resources.

Other agencies include; Electricity Regulatory Authority, Atomic Energy Council, Electricity Disputes Tribunal, Rural Electrification Board, Rural Electrification Agency, Uganda Electricity Generation Company Limited, Uganda Electricity Transmission Company Limited (UETCL), The Uganda Electricity Distribution Company Limited (UEDCL), Uganda Energy Credit Capitalisation Company (UECCC and the Directorate of Water Development.

The above key state institutions and other partners like Umeme, Eskom, Bujagali hydro power public-private sector co-financed project, solar power plants in Soroti and Tororo have been central to this electricity generation, distribution and usage call and cause and greatly contributed in attaining the planned Uganda Vision 2040 of increasing in the country's electricity production in order to meet with energy needs of an ever-increasing population growth and socio-economic activities.

As showed earlier, sustainable development as a principle has been harnessed in the whole world, and it works hand in hand with three pillars that is; sustainable business, environmental sustainability and intergenerational equity (WCED, 1987). With time, these pillars kept on developing and there arose need for enthusiastic development hence enhancement of clean technologies like renewable energy which if well-developed will bring about sustainable

development through promoting and successfully implementing the three pillars.

#### **4.6 Renewable Energy Law, Policy and Trade Regime: Challenges towards a Greener Economy**

The transition to a greener economy requires a comprehensive legal and policy regime that addresses the multifaceted challenges of renewable energy adoption. This section analyses Uganda's renewable energy laws and policies in the context of their effectiveness in promoting a sustainable and competitive trade regime. The discussion will focus on the challenges posed by policy inconsistencies, regulatory inefficiencies, and the broader socio-economic impacts of transitioning to a green economy.

Renewable Energy Expansion is considered internationally as a key for tackling climate change and greening economy and development<sup>66</sup>. Rio+20 Outcome on “The Future we want” under the section on energy recognize that improving energy efficiency, increasing the share of renewable energy and cleaner and energy-efficient technologies are important for sustainable development, including in addressing climate change (para.128). Launching of the initiative by the Secretary-General on Sustainable Energy for All (SE4A), which focuses on access to energy, energy efficiency and renewable energies was a commendable effort. The Rio+20 Outcome made a declaration that they were all determined to act to make sustainable energy for all a reality and, through

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<sup>66</sup>Yukari Takamura (2015): Renewable Energy Law and Policy and Trade Regime: Challenges Towards a Greener Economy; Nagoya University; E-Mail: [Takamura.Yukari@G.Mbox.Nagoya-U.Ac.Jp](mailto:Takamura.Yukari@G.Mbox.Nagoya-U.Ac.Jp)  
UNEP Seminar on Legal Foundation on Environmental Sustainability; July 14, 2015

this, help to eradicate poverty and lead to sustainable development and global prosperity (para.129).

Sustainable Development Goal (SDG) 7 strives to ensure access to affordable, reliable, sustainable and modern energy for all. In this effort it targets to ensure universal access to affordable, reliable and modern energy services, increase substantially the share of renewable energy in the global energy mix and double the global rate of improvement in energy efficiency by 2030. By 2030 to enhance international cooperation to facilitate access to clean energy, research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology as well as expand infrastructure and upgrade technology for supplying modern and sustainable energy services for all in developing countries, in particular least developed countries and small island developing States.

Enhancing renewable energy has multiple benefits from local to global level including tackling climate change, enhancing self-sufficiency of energy, reducing payment for fossil fuels from overseas, ensuring international competitiveness, creating employments, revitalizing rural areas and ensuring energy in case of disaster among others.

However, there are a number of cases related to renewable energy before WTO. There is an increasing number of requests for consultation relating to renewable energy related measures has been brought before the WTO dispute settlement body. These include: -

- Canada - Renewable Energy case, brought by Japan (2010) (DS412) and EU (2011) (DS426): Ontario FIT case<sup>67</sup>. Feed-in Tariff (FIT) Scheme is a policy tool characterized by a couple of key elements including guaranteed purchase price for electricity with long-term contracts and guaranteed grid access. The province of Ontario introduced a FIT program under its Green Energy and Green Economy Act (2009) with the aim of eliminating coal-fired power generators through increasing renewable energy and creating jobs. In order to be eligible, the FIT program requires use of equipment of renewable energy generation facilities supplied from Ontario in specified amounts or proportions (Minimum Domestic Content level; “made in Ontario” provision).
- China - Measures concerning wind power equipment, brought by the US (2011) (DS419)<sup>68</sup>
- EU and certain member states - Certain Measures Affecting the Renewable Energy Generation Sector, brought by China (2012) (DS452)<sup>69</sup>
- India - Certain Measures Relating to Solar Cells and Solar Modules, brought by the US (2013) (DS456)<sup>70</sup>
- United States – Countervailing Duty Measures on Certain Products from China (Complainant: China)<sup>71</sup> (2012) (DS437)

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<sup>67</sup> Ibid

<sup>68</sup> Ibid

<sup>69</sup> Ibid

<sup>70</sup> Ibid

<sup>71</sup> Ibid

- EU – Certain Measures on the Importation and Marketing of Biodiesel and Measures Supporting the Biodiesel Industry (Complainant: Argentina)<sup>72</sup> (2013) (DS459)

#### 4.6.1 Climate Change and Renewable Energy

Greenhouse gases (GHG), including CO<sub>2</sub> emissions are associated with the conventional provision of energy services and are a major cause of climate change<sup>73</sup>. Globally, coal is the second largest primary energy source used worldwide (preceded by oil), and the first source for power generation. In terms of electricity generation or supply, South Africa is highly dependent on coal-fired power plants and therefore energy supply is carbon dioxide-intensive. Studies conducted on coal usage indicated that household coal burning contributed the largest percentage followed by industrial and commercial usage. Based on 2008 fossil-fuel CO<sub>2</sub> emissions, South Africa was rated the 13<sup>th</sup> largest emitting country in the world and the largest emitting country on the continent of Africa.

Monitoring and reporting of GHG emissions is done by defining the specific carbon footprint, expressed in carbon dioxide equivalent (CO<sub>2</sub> eq.) of an activity, site or operation. GHG emissions reporting is not currently mandatory in South Africa, however, industry and regulators broadly anticipate increasing implementation of regional and international carbon reporting and reduction requirements through various means, including mandatory reporting, carbon pricing, caps, taxes and trading. A growing

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<sup>72</sup> Ibid

<sup>73</sup>Department Of Environmental Affairs (2015): EIA Guideline for Renewable Energy Projects. Department Of Environmental Affairs, Pretoria, South Africa, pp 25

number of energy producers today anticipate a future regulatory mandate for GHG emissions reporting by participating in voluntary corporate reporting. Many companies and cities participate in the voluntary reporting initiative, the not-for-profit Carbon Disclosure Project (CDP), the only global system to measure, disclose, manage and share vital environmental information. The CDP holds the largest collection of primary climate change, water and forest-risk information in the world, and use this information to assist industries and governments to collaboratively manage environmental risk ([www.cdproject.net](http://www.cdproject.net)). This risk can be managed in part by increasing renewable energy sources, and reducing reliance on carbon-intensive energy provision services.

Renewable energy sources play a role in providing energy services in a sustainable manner, and in particular in mitigating climate change. Eskom, South Africa and Uganda's largest energy generating services has a comprehensive climate change strategy which is based on six pillars<sup>74</sup>: Diversification of the generation mix to lower carbon emitting technologies; Energy efficiency measures to reduce demand and greenhouse gas and other emissions; Adaptation to the negative impacts of climate change; Innovation through research, demonstration and development; Investment through carbon market mechanisms; and Progress through advocacy, partnerships and collaboration

Increasing the share of renewable energy in the energy industry is an effective way of making our energy supply more environmentally friendly, diversifying

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<sup>74</sup>Department Of Environmental Affairs (2015): EIA Guideline for Renewable Energy Projects. Department Of Environmental Affairs, Pretoria, South Africa Pg. 27

energy sources, reducing the effects of climate change as well as contributing to sustainable development.

#### 4.6.2 Sustainable Energy and Development

Sustainable energy<sup>75</sup> can be defined as energy which provides affordable, accessible and reliable energy services that meet economic, social and environmental needs within the overall developmental context of society, while recognising equitable distribution in meeting those needs. Sustainable energy is an element of sustainable development which is defined as development that meets the present needs and goals of the population without compromising the ability of future generations to meet theirs. On the overall sustainable development is underpinned by economic development (growth efficiency), social development (culture, heritage, poverty, and empowerment) and environmental development (pollution and natural resources).

Renewable energy is considered as a contribution to sustainable development<sup>76</sup>. Most renewable energy sources are indigenous and naturally available, and the use of renewable energy therefore strengthens energy security because it is not subject to disruption by international crisis. Fuel wood, charcoal, coal and kerosene (paraffin) in the rural and peri-urban South Africa is the primary source of energy for cooking and heating. Sustainable development implies replacing firewood and charcoal with more modern energy sources, while at the same time introducing technological

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<sup>75</sup> Ibid

<sup>76</sup>United Nations Conference On Sustainable Development, Rio+20; Rio De Janeiro, Brazil, 20-22 June 2012; [A/Conf.216/16 - Report Of The United Nations Conference On Sustainable Developmentrio+20 Conference Website](#)

innovations to improve the efficiency and environmental problems associated with coal and kerosene. Sustainable development also implies the provision of electricity and other modern fuels to the commercial and industrial sectors to promote their economic competitiveness and future prosperity.

The United Nations Conference on Sustainable Development<sup>77</sup> - or Rio+20 - took place in Rio de Janeiro, Brazil on 20-22 June 2012. It resulted in a focused political outcome document which contains clear and practical measures for implementing sustainable development. In Rio, Member States decided to launch a process to develop a set of Sustainable Development Goals (SDGs), which will build upon the Millennium Development Goals and converge with the post 2015 development agenda

#### **4.6.3 Sector Regulation**

The Role of the Sector Regulator is specified in the enabling legislation. For example, regulatory oversight of feed-in tariff (TIF) programs is essential, whether the price is based on a predetermined number (and with some maximum capacity), an auction/bidding process, or avoided cost. In each case, the regulator monitors activities to ensure abuses do not arise. How external (environmental and health) costs are factored into program evaluation is partly dependent on the enabling legislation (or executive order).<sup>78</sup> If the law establishes Renewable Portfolio Standards, the energy regulator will need to oversee the system and evaluate its effectiveness in

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<sup>77</sup> Ibid

<sup>78</sup> Uganda Renewable Energy Feed-In Tariff (Refit) Phase 2 guidelines: Revised 15th November 2012

meeting RE objectives.<sup>79</sup> Generally, some other agency is responsible for certifying the generators and handling the certification system.

The sector regulator has a number of roles and responsibilities for operationalizing and implementing RE. The policy instruments include those oriented towards prices and quantities. The former (such as Feed-in Tariffs) provide the supplier with certainty regarding price, but the volume depends on whether that price is high or relatively low. The latter includes renewable portfolio standards that require distribution companies to purchase specific quantities of electricity generated by renewable technologies.

In addition, the sector regulator is in a position to give advice to the government regarding the full implications of focusing on climate change or energy security. Policy makers, however, may choose to delegate these decisions, or a subset of them, to regulators; on the other hand, they may choose to remain silent on such issues. In the former case, of course, regulators have the power to exercise their discretion. In the latter case, the scope of regulatory discretion depends on what the legal system provides. In either case, the internal practices followed by the regulator need to provide legitimacy for regulatory rulings related to RE. Such practices include transparency and evidence-based decision-making.

#### **4.6.4 Conclusion**

Uganda's efforts to establish a green economy are hampered by several key challenges, including regulatory inefficiencies and policy misalignments.

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<sup>79</sup> Butler & Neuhoff, *"Competitive Auction Mechanisms for The Promotion Renewable Energy Technologies: The Case of the 50 Mw Photovoltaics Projects in Cyprus"*. Angelikikylili, Paris A. Fokaides (2008)

While the Renewable Energy Policy (2007) sets the groundwork for green energy development, the lack of coherent implementation strategies and insufficient financial support for renewable energy projects continues to pose significant barriers. Furthermore, Uganda's trade regime does not adequately support the integration of renewable energy into the market, resulting in missed opportunities for economic diversification. Strengthening these frameworks is critical to overcoming the current challenges and accelerating Uganda's transition to a greener economy.

#### **4.7 Legal and Policy Framework for Compliance to Environmental Standards during Renewable Energy Production**

This section explores Uganda's legal and policy framework for ensuring compliance with environmental standards in the production of renewable energy. The focus will be on evaluating the effectiveness of these frameworks in balancing environmental sustainability with the country's energy needs. The analysis will also consider Uganda's compliance with international environmental standards, particularly in the context of renewable energy production.

In addition to the international and regional compliance standards, the legal regime governing the energy sector in Uganda is also constituted by locally tailored policy and legislative compliance requirements. The major policy and legislative environmental compliance requirements were developed after 1994 with the formulation of the National Environment Action Plan. This saw the development of the major National Environment Management Policy and the National Environment Act as Uganda's framework legislation. It is under these

that subsequent policy and legislation have developed. Legislation covered in this chapter includes the Constitution, major oil and gas laws and other relevant environmental laws, international treaties, conventions and best practices .

Compliance with these policy and legislative aspirations and standards will enable Uganda develop an environmentally healthy, safe and sustainable oil and gas sector.

#### **4.7.1 Compliance Standards under the National Legal Framework for Renewable Energy**

This section contains the necessary detail of policies and legislation related to environmental conservation and protection.

##### ***a. The Constitution of the Republic of Uganda (1995) (as amended)***

The 1995 Constitution of the Republic of Uganda has elaborate provisions regarding environmental management. In the National Objectives and Directive Principles of State Policy, the Constitution requires the Government of Uganda to take measures to protect important natural resources, including land, water, wetlands, minerals, oil, fauna and flora on behalf of the people of Uganda<sup>80</sup>. The government is also required to promote and implement energy policies that will ensure that people's basic needs and those of environmental preservation are met. It is further required to promote the rational use of natural resources so as to safeguard and protect the bio-diversity of Uganda. The Constitution also

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<sup>80</sup> The Constitution of the Republic of Uganda (1995) (as amended), Principle Xiii

requires government to promote a good water management system at all levels<sup>81</sup>; promote sustainable development and public awareness of the need to manage land, air, water resources in a balanced and sustainable manner for the present and future generations and to prevent or minimize damage and destruction to land, air and water resources resulting from pollution or other causes<sup>82</sup>.

In the substantive provisions, the Constitution has a specific provision for the right to a clean and healthy environment. Under Article 39, every Ugandan has a right to a clean and healthy environment. This provision is reiterated under section 3 of the National Environment Act, 2019; and section 5(2) of the National Forestry and Tree Planting Act No. 8 of 2003 which all provide for the right to clean and healthy environment. The breach of the right entitles any person or responsible body to bring an action in furtherance of the right.

The Constitution vests the ownership of all minerals and petroleum in the government which is to hold the same on trust for the people of Uganda <sup>83</sup>

Further still, under Article 245 of the Constitution, Parliament is mandated to enact laws to protect and preserve the environment from pollution and degradation.

***b. The Electricity Act 1999***

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<sup>81</sup> Ibid. Principle Xxi

<sup>82</sup> Ibid. Principle Xxvii

<sup>83</sup> Ibid. Article 244

The Electricity Act 1999 provides the legal framework for reforms in the Power Sub-sector, the Rural Electrification Strategy and Plan, the regulatory framework for power generation from small renewable energy sources and the establishment of the Rural Electrification Fund.

**c. *The National Environment Act, 2019***

The National Environment Act (NEA) is Uganda's principal legislation on environmental law and its central tenet is sustainable environmental management in order to achieve sustainable development.

It establishes the National Environment Management Authority (NEMA) as a body responsible for coordinating, monitoring and supervising all environmental matters in Uganda<sup>84</sup>. The NEA confers on every person has a right to a healthy environment and obligates every person to maintain and enhance the environment<sup>85</sup>.

The Act further requires that an Environmental Impact Assessment (EIA) be undertaken by a developer where the lead agency, in consultation with the executive director, is of the view that the project may have an impact on the environment; is likely to have a significant impact on the environment; or will have a significant impact on the environment<sup>86</sup>.

**d. *The Water Act Cap 152***

The Water Act is one piece of Uganda's environmental legislation with key provisions to enhance sustainable development of water resources. It

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<sup>84</sup> The National Environment Act, 2019, Section 8

<sup>85</sup> Ibid Section 3

<sup>86</sup> Ibid Sections 110, 111

provides for the use, protection and management of water use and supply. Most of its provisions have the key objective of protecting the environment and in turn ensuring all water resource-based development is sustainable.

**e. Petroleum Exploration, Development and Production Act (PEDPA) of 2013**

The PEDPA is the principal legislation governing oil and gas activities in Uganda. It ensures public safety, protection of public health, and environmental considerations in petroleum activities. The Act also includes provisions for decommissioning and abandonment procedures to protect the environment.<sup>87</sup>

**f. The Petroleum (Refining, Conversion, Transmission, and Midstream Storage) Act, 2013**

This Act ensures public safety, protection of public health, and environmental considerations in midstream operations. It restricts flaring and venting under normal operating conditions and provides provisions for the decommissioning of petroleum facilities.<sup>88</sup>

**g. *The National Environment Management Policy (1994)***

The National Environment Management Policy is an output of the National Environment Action Plan (NEAP) process. The overall goal of the policy is to establish sustainable social and economic development, which maintains or enhances environmental quality and resource productivity on a long-term basis that meets the needs of the present generation without

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<sup>87</sup> Petroleum Exploration, Development and Production Act (PEDPA) of 2013, Ss.1(e) & 112-120

<sup>88</sup> Ibid. Ss. 1(g) & 43-51)

compromising the ability of the future generation to meet their own needs<sup>89</sup>. Specifically, the policy seeks to meet the following objectives:<sup>90</sup>

To enhance the health and quality of life of all people in Uganda and promote long-term sustainable, socio-economic development through sound environmental and natural resource management and use; integrate environmental concerns in all development policies, planning and activities at national, district and local levels, with full participation of the people; and conserve, preserve and restore ecosystems and maintain ecological processes and life support systems, especially conservation of national biological diversity. This is geared at ensuring that there is adequate environmental health and safety.

The policy also seeks to optimize resource use and achieve a sustainable level of resource consumption; raise public awareness to understand the appreciate linkages between environment and development; and ensure individual and community participation in environmental improvement activities. Underlying these broad policy objectives are certain key principles which guide policy development and implementation strategies:<sup>91</sup>

#### ***h.* The National Oil and Gas Policy, 2008**

The National Oil and Gas Policy of 2008 emphasizes the conservation of the environment and biodiversity in oil and gas activities. It calls for the

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<sup>89</sup> The National Environment Management Policy (1994), Chapter 2 Part 2.1

<sup>90</sup> Ibid. Part 2.2

<sup>91</sup> Part 2.3

establishment of an institutional and regulatory framework to address environmental issues relevant to the sector.<sup>92</sup>

**i. The National Climate Change Policy, 2013**

The National Climate Change Policy aims to promote the development and use of clean energy technologies and reduce greenhouse gas emissions. It emphasizes the need for balancing adaptation and mitigation measures to address climate change impacts<sup>93</sup>.

**j. Environmental Regulations**

Several environmental regulations have been enacted to regulate the oil and gas sector in Uganda. These include regulations;

- i. The National Environment (Environmental Impact Assessment) Regulations, S.I.143 of 2020 - ESA Regulations, 2020.
- ii. The National Environment (Waste Management) Regulations, S.I. 48 of 2020.
- iii. The Petroleum (Waste Management) Regulations, S.I. 3 of 2019.
- iv. The National Environmental (Standards for Discharge of Effluent in Water and Land) Regulations, 2020.
- v. The National Environment (Oil Spill Prevention, Preparedness and Response) Regulations, 2020.
- vi. The National Environment (Noise Standards and Control) Regulations.
- vii. The National Environment (Management of Ozone Depleting Substance Products) Regulations, S.I. 48 of 2020.

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<sup>92</sup> The National Oil and Gas Policy, 2008, Objective IX

<sup>93</sup> Ministry of Energy and Mineral Development (MEMD), Development Sector Plan (Uganda) 27.

- viii. The National Environment (Wetlands, River Banks, and Lakeshores Management) Regulations 153-5.

#### 4.7.2 International Environmental Standards and Best Practices

Uganda is committed to international environmental treaties and follows best practices to protect the environment. These include the Convention on Biological Diversity (CBD), the Kyoto Protocol and the United Nations Framework Convention on Climate Change (UNFCCC). These international agreements guide Uganda's efforts to address biodiversity conservation and reduce greenhouse gas emissions.

##### a. Treaties and Conventions

###### i. Convention on Biological Diversity (CBD):

This convention aims to promote the conservation of biodiversity and the sustainable use of its components, as well as the fair and equitable sharing of benefits arising from genetic resources. Uganda ratified the CBD in 1993, and its commitments are reflected through the National Biodiversity Strategy and Action Plan<sup>94</sup>.

###### ii. Kyoto Protocol of the United Nations :

Uganda ratified the Kyoto Protocol on March 25, 2002. The protocol recognizes the global need for significant reduction of greenhouse gas emissions worldwide<sup>95</sup>.

###### iii. United Nations Framework Convention on Climate Change (UNFCCC):

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<sup>94</sup> Ibid. p. 36

<sup>95</sup> Ibid.

This multilateral environmental agreement addresses the global consequences of increasing greenhouse gas emissions. It sets out targets for reducing emissions and works with countries to build capacity for emission reductions.

**b. International Best Practices**

**i. Environmental and Social Impact Assessment (ESIA):**

A good environmental program consists of five best practices: (i) an ESIA, (ii) a management system of procedural rules that allow project operators to prevent and detect violations, (iii) performance evaluations that measure actual performance against targets, (iv) monitoring and auditing, and (v) reporting<sup>96</sup>.

**ii. National Biodiversity Strategy and Action Plan (NBSAP):**

The NBSAP contains an overall framework for biodiversity conservation. It involves direct environmental and natural resource (biodiversity) management and puts in place measures to reduce and manage the negative impacts on biodiversity<sup>97</sup>.

**4.7.3 Conclusion**

The legal and policy framework governing environmental compliance in renewable energy production in Uganda shows a commitment to sustainability but is limited by weak enforcement mechanisms. Although regulations like the National Environmental Act provide the foundation for protecting environmental standards, the lack of institutional capacity and resources

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<sup>96</sup>Claude D. et al, International Petroleum Exploration and Exploitation Agreements 2 ed. (2009), pg. 385

<sup>97</sup> The Uganda Green Growth Development Strategy 2017/18 - 2030/31, p. 20

continues to hinder effective compliance. To ensure that renewable energy production contributes to environmental sustainability, stronger enforcement and clearer guidelines for industry players are required.

#### **4.8 Institutional Framework for Enforcing Compliance to Environmental Law Standards during Renewable Energy Production**

Effective enforcement of environmental laws is critical for ensuring that renewable energy projects are both sustainable and legally compliant. In Uganda, several institutions oversee this process, including the Ministry of Energy and Mineral Development, the Ministry of Water and Environment, and key regulatory authorities. This section provides a concise analysis of their roles.

##### **4.8.1 Ministry of Energy and Mineral Development (MEMD)**

The MEMD is the central institution responsible for managing the energy sector in Uganda, including renewable energy projects. The Ministry plays a key role in issuing operating licenses to companies engaged in energy production, ensuring that these companies comply with the National Environment Act and other related environmental regulations.

A core requirement is the completion of an Environmental and Social Impact Assessment (ESIA) before any project begins. This assessment ensures that all potential environmental health and safety risks are adequately mitigated. The Ministry's oversight ensures alignment with Uganda's Vision 2040, which prioritizes energy access as a catalyst for rural development and poverty alleviation.

##### **4.8.2 Ministry of Water and Environment (MWE)**

The MWE oversees environmental protection and water resource management. This Ministry is tasked with regulating activities that could impact natural water bodies, and it is pivotal in enforcing environmental compliance during renewable energy development.

The Directorates of Water Resources Management and Environmental Affairs within the Ministry play crucial roles in ensuring that projects comply with Uganda's water conservation laws. These Directorates also work closely with the National Environment Management Authority (NEMA) to monitor the environmental impacts of energy projects.

#### **4.8.3 National Environment Management Authority (NEMA)**

NEMA is the principal environmental regulatory body in Uganda, responsible for monitoring compliance with environmental standards. It enforces the National Environment Act and provides oversight through environmental audits and impact assessments.

One of NEMA's critical roles is to evaluate environmental audits submitted by companies engaged in renewable energy production. By identifying environmental risks early in project development, NEMA helps mitigate potential harms to ecosystems, ensuring the sustainability of renewable energy projects.

#### **4.8.4 Conclusion**

Uganda has developed a comprehensive institutional framework to regulate environmental compliance within its renewable energy sector. Key institutions such as the MEMD, MWE, and NEMA ensure that environmental laws are enforced, safeguarding the nation's environmental resources while promoting sustainable energy development.

## **5 DISCUSSION OF THE FINDINGS, RECOMMENDATIONS AND CONCLUSIONS**

### **5.1 Overview**

This chapter presents the key findings of this research, analysing them in alignment with the specific objectives outlined at the beginning of the study. It begins by evaluating the effectiveness of Uganda’s legal framework in promoting the energy transition, focusing on the responsiveness of policies and regulations toward renewable energy. This is followed by an assessment of the socio-economic impacts of the energy transition, particularly how increased access to renewable energy influences household income, electricity demand, and broader social and economic development. The chapter also explores the nexus between renewable energy utilization and rural development, highlighting the role of energy transition in transforming Uganda’s rural areas.

In this chapter, the findings are critically discussed to offer deeper insights into how Uganda’s legal, regulatory, and socio-economic structures interact with the goals of a just and sustainable energy transition. Drawing from these findings, the chapter proposes key recommendations for enhancing the existing legal and policy frameworks to foster a more effective transition towards renewable energy. The chapter concludes by summarizing the major takeaways and their implications for Uganda’s energy future.

### **5.2 Discussion of Findings: Legal Framework and Its Effectiveness in Promoting Energy Transition**

The Renewable Energy Policy follows the commitment in the National Energy Policy 2002 to develop the use of renewable energy resources in Uganda. The Government’s overarching policy vision for renewable energy is to make

modern renewable energy a substantial part of national energy consumption, where modern renewable energy is understood to mean renewable energy resources that are transformed into modern energy services like electricity.

### **5.3 Discussion of Findings: Socio Economic Impacts of Renewable Energy Transition**

#### **5.3.1 Greater Electricity Connection**

Electricity connection in Uganda has increased in the number of Connected Customers from 103 in 2009 to 3,742 by 31<sup>st</sup> August 2019<sup>98</sup>. This is only 1.25% of the population of 297,700. The new Electricity Connection Policy (ECP) has commenced and to date there are 204 customers connected using ECP. The The Pader -Abim Community Multipurpose Electric Society (PACMECS Ltd), the sole electricity distributor in the district is seeking off grid technologies (mainly PV Solar) to boost customer connections in isolated areas.

Tackling greater electricity connection is equal to tackling poverty eradication in the district. This is because even if electricity is delivered within the household vicinity the household members are unable to connect. Off-grid solutions are emerging as an important driver of rural electricity access<sup>99</sup>. Emerging evidence suggests off-grid solar electricity reaches about 141 million people in rural areas in the developing world, complementing grid electrification. Uptake is highly concentrated in about a dozen pioneering countries. However, affordability remains a key concern<sup>100</sup>. Estimates suggest that, even in countries with universal access, affordability concerns affect

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<sup>98</sup>Chairman Board of Directors of Pacmecs Ltd to The Annual General Meeting (AGM) Of 31<sup>st</sup> August 2019

<sup>99</sup>2018 HLPF Review of SDG Implementation: SDG 7- Ensure Access to Affordable, Reliable, Sustainable and Modern Energy for All

<sup>100</sup> Ibid

about 30 per cent of the population; in countries working toward universal access, affordability affects 57 per cent of those who already have access.

Electricity access in Uganda still remains low at about 20%<sup>101</sup> for all forms of energy. This very low level of access is an impediment to achieving social and economic transformation of the country. I interrogated the Managing Director of EleQtec Technical Services Limited about the reasons as to why most Ugandans do not have electricity.

He said, *‘the major obstacles to electricity access have been identified as high connection charges and yet Ugandans are poor, high house wiring costs and this has been worsened by closure of businesses during the lockdown. There is also a problem with service providers, they lack incentives to make timely and cost affordable connections. Another problem is that Previous policies and strategies adopted by the government majorly focused on putting in place the back bone infrastructure and developing the backbone of Uganda’s economy which is agriculture while electricity connections have remained unsupported.’*

The primary objective of the electricity connection policy (ECP) is to increase electricity access and provide cleaner energy for Ugandans. The policy addresses the major obstacles that have hindered increasing electricity access in Uganda.

Electricity access targets, as spelt out in the Government major development plans, are to be achieved under the ECP which initially aims at achieving the

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<sup>101</sup> Uganda Bureau of Statistics (UBOS), 2016 Statistical Abstract (2016)

26% rural access target by 2022 as set out in the Second Rural Electrification Strategy and Plan, 30% national coverage target by 2020 as set out in the Second National Development Plan/ the ECP will also aim at accelerating access after 2020 in order to achieve 60% access rate by the year 2027, after which it will be revised to enable achievement of the 80% Vision 2040 connection target and, thereafter, universal coverage. The 60% target is the minimum and may be surpassed as more funding becomes available<sup>102</sup>.

### **5.3.2 Increased Household Income**

Access to electricity has been identified as one of the key drivers to social and economic transformation in Uganda. Electricity is a modern form of energy that has a direct effect on agriculture and economic productivity, opportunities for income generation, and more generally the ability to improve living conditions<sup>103</sup>.

The 2016 Statistical Abstract of Uganda indicates that only 5% of the rural households are connected to grid electricity, and when all other forms of modern energy are included, electricity connectivity by rural households is only 10.3% which is far below the Sub-Saharan average of 29%. The Uganda National Housing and Population Census 2014 estimates that 85% of the population in Uganda live in rural areas and are engaged in substance economic activities with negligible value addition partly due to unavailability of electricity connection

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<sup>102</sup>Electricity Connection Policy: Financing And Implementation for Connections, Period 2018 – 2027. Ministry Of Energy and Mineral Development

<sup>103</sup>Ibid

### 5.3.3 Increased Electricity Demand

The Pader- Abim Community Multipurpose Electric Society (PACMECS Ltd) is an Electricity Cooperative Society duly licensed by government to operate in the Northern Service Territory (NST)<sup>104</sup> consisting of the districts of Pader, Abim, Agago, Kaabong, Kitgum, Kotido, Lamwo, Omoro and some portions of Lira. The 33 kV Lira - Kitgum feeder is the main source of power to the NST. As the area grows in development this needs to be upgraded to possibly 66 kV.

As a vote of confidence in PACMECS' capability in running the business, the Government of Uganda, through Rural Electrification Agency will soon hand new lines to PACMECS Ltd for management. Expected new lines of Kaabong and Kotido networks are about to be commissioned and handed over to PACMECS Ltd including Namukora - Kotido - Kaabong - Karenga lines.

New networks under the NST densification programme are Kona Paculu-Omot; Kalongo- Wol; Kalongo- Paimo- Omiya- Pachwa- Namokora; Kalongo-Lira Kato- Adilang<sup>105</sup>. This grid densification will enhance extensions of Medium Voltage (MV) lines and LV of three phase and single-phase lines. A number of transformers shall be installed. The boundary metering point of Apala-Adwari - Kiru feeder has been operationalised and is feeding Lotukei - Morulem line up to Abim town; that in turn is a ring circuit access to the Kilak - Abim feeder in cases of outages from either feeder.

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<sup>104</sup>Ibid

<sup>105</sup> Ibid

#### 5.3.4 Discussion of Findings: Social and Economic Development

Government has been implementing electricity access projects in rural Uganda. Through the implementation of these projects, it has been observed that electricity is one of major drivers of social and economic transformation<sup>106</sup>. Information documented under previously implemented projects shows great improvement in standards of living of the beneficiaries. Consumers have gone on to use the electricity for entertainment, refrigeration, phone charging, ironing, reading and to power their businesses, among others.

I asked the Company manager of SNAVE Agencies Limited, about their future goals for the energy Sector. *He said that the Economic and environmental benefits will be many. An average new connection of 300,000 annually will translate to US\$950 million in ten years<sup>107</sup> as an additional revenue for the electricity service providers (ESP) hence contributing to increasing their sustainability and viability. Additionally, energy consumption will increase as a result of connecting more consumers. This is expected to rise when consumers engage in productive use of energy and as well the connection of bigger industries that will result.*

The social benefits include increased personal security as a result of provision of outside lighting, increased average reading time for students and pupils which will eventually contribute to their improved academic performance. Another key social benefit is the improved delivery of health services due to

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<sup>106</sup> Renewable Energy Agency, REA Access Reports 2018 (2018)

<sup>107</sup> Electricity Connection Policy: Financing And Implementation for Connections; Period 2018 – 2027; Ministry of Energy and Mineral Development

the ability to power medical equipment, provision of better lighting for health centres and refrigeration of vaccines.

Poor access to energy in developing countries slows the growth of GDP. Research has shown that, for example, the under-performance of Africa's power infrastructure has restricted economic growth, reducing per capita GDP growth by 0.11 per cent per year for the continent as a whole, and by as much as 0.2 per cent in Southern Africa<sup>108</sup>. This is a barrier to growth for businesses in these markets as well.

A number of companies are taking part in public-private projects to improve energy access, one example being "Power Africa", where the governments of Ghana, Tanzania, Kenya, Uganda, Nigeria, Ethiopia and Liberia and a group of private sector firms are taking part in an initiative to improve access to clean, reliable power in Africa, and ultimately deliver electricity to more than 20 million new households and companies by 2018<sup>109</sup>. South Africa occupies a central position in the global debate regarding the most effective policy instruments to accelerate and sustain private investment in renewable energy. In 2009, the government began exploring feed-in tariffs (FITs) for renewable energy, but these were later rejected in favour of competitive tenders. The resulting program, now known as the Renewable Energy Independent Power Producer Procurement Program (REIPPPP), has successfully channelled substantial private sector expertise and investment

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<sup>108</sup>Foster, V., & Briceño-Garmendia, C. (2013): Africa's Infrastructure A Time for Transformation, 2013 <http://bit.ly/1tkyo6n>

<sup>109</sup>Standard Chartered Press Release, 30/07/14 <http://bit.ly/1yv2gfk>

into grid-connected renewable energy in South Africa at competitive prices<sup>110</sup>.

#### 5.4 Discussion of Findings: Nexus between Renewable Energy Utilization and Rural Development

In a discussion with the legal adviser of **Sun Topway Solar Uganda Limited** about the relationship between renewable energy and rural development. He said,

*Renewable energy utilization is a catalyst to rural development<sup>111</sup>. It facilitates rural development. Rural development is in fact a multi-sectorial activity that generates synergy effects. This approach includes “Integrated Rural Development,” which effectively combines multiple sectors and techniques from health care service, agricultural expansion, and education, improvement of infrastructure to technical transfer, choosing specific regions and treating the local governments as counterparts. This approach has advantages when coping with multidisciplinary issues such as poverty, or tackling regional problems and in obtaining participation of the people concerned. However, despite intensive investment in a limited area, effects are not easily spread to other areas. Actually, there are a considerable number of projects that have not been applied to other areas in the past, even though they were considered “model” projects.*

For this reason, it is important to establish a system to disseminate know-how acquired from the implementation of rural development projects and

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<sup>110</sup>Eberhard, Kolker and Leigland (2014): South Africa’s Renewable Energy IPP Procurement Program: Success Factors and Lessons, May 2014 <http://www.gsb.uct.ac.za/files/ppiafreport.pdf>

<sup>111</sup>World Bank, African Development Indicators 2003 (World Bank, 1975)

programs. This is because activities that are implemented in a limited area and have an only slight spillover effect are not suitable from the viewpoint of equity and public interests<sup>112</sup>. Also, NGOs may be able to implement more cost-effective activities. Coordination between concerned organizations such as governmental organizations, donors, NGOs and communities must be coordinated in multi-sectorial rural development projects. Also, it is important to implement projects with the cooperation of two or more ministries or agencies.

The current situation and issue in Rural Development,<sup>113</sup> is the Importance of Poverty Reduction. The overall purpose of development assistance is to improve the livelihoods of citizens in recipient countries, especially the impoverished. Poverty reduction is internationally recognized as an important assistance issue. For example, in 1996 the DAC set a clear achievement goal in its action policy to reduce poverty.

Development cooperation focusing on rural development is a very important component for poverty reduction for the following reasons: *Approximately three-quarters of the world's impoverished live in rural areas<sup>114</sup>; Many poor people in cities are migrant workers and farmers who have left rural areas<sup>115</sup>; Therefore, if living standards and income generations in rural areas are enhanced and rural immigrants to cities return to rural areas, excessive*

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<sup>112</sup>Ibid

<sup>113</sup>The Contents of "Rural Development" need to be revised after coordination between "Rural Development" and "Poverty Reduction" JICA Thematic Guidelines

<sup>114</sup>World Bank (2001a)

<sup>115</sup>..In many developing countries, there has been an acute population shift from rural to urban areas, and many of those who have migrated and belong to the low-income group have no choice but to engage in the informal sector which is insecure, low-wage, and has a poor environment.

*population influxes to cities should be reduced, causing poverty in the cities to decrease; and Improvement of rural areas can be a safety net when there is a lack of job opportunities in cities due to depressed economic conditions.*

Also, many governments in developing countries have recently been shifting to decentralization in order to adequately deal with local needs. Due to the necessity for an active local economy within decentralization, rural development is receiving increasing attention. The main actors of development activities are also changing. Since the end of 1980s, many developing countries' governments have shifted from bureaucrat-oriented to public-oriented bodies. Therefore, bureaucrat-oriented development approaches such as "large-scale farm development and agricultural modernization" are changing to people-centred approaches to rural development with a focus on establishing a system to facilitate community participation and the effective use of local resources. This in turn requires flexible, tailored cooperation from donors based on local conditions.

#### **5.4.1 General Health Improvement**

One aspect of poverty in rural areas is the unsatisfactory health conditions of local people. Unhealthy and ill people cannot perform to the best of their capabilities nor make efforts to improve their living conditions. Therefore, the promotion of rural development necessitates the improvement of health conditions for local people. Usually, impoverished people tend to have insufficient nutrition, are not vaccinated, or live in unhealthy conditions. On top of this, suitable medical treatment cannot be obtained in many rural areas due to a lack of sufficient public medical services. These inadequate

medical facilities and lack of treatment in turn leads to other family members having to take care of the ill, lowering the productivity of the family as a whole.

Therefore, an expansion of public medical services and improvement of sanitary conditions are essential.

Health conditions of local people can be improved not only through the development of medical facilities but also by increasing people's knowledge regarding health care

PHC activities should be emphasized more in the future. Participation of local people and administrative officers in PHC activities is an important precondition for success, as focus must be converted from treatment to prevention.

#### **5.4.2 Improvement of Educational Standards**

The improvement of educational standards is a very important element for income generation. Literacy skills enable local people to read manuals on agricultural techniques and equipment, increasing agricultural productivity. Local people with literacy skills can acquire information on their society needs. Moreover, as educational background is an important factor for obtaining a better job, highly educated emigrant workers tend to get jobs easier and earn a higher income.

Although assistance approach for education is detailed in the report of "Basic Education", the improvement of formal education for children and the expansion of non-formal education for adults are important elements in rural development. There are two approaches in the improvement of formal

education for children: school construction and improvement of educational quality (quality of teachers, curriculum, etc.). Many developing countries face a lack of school buildings and teachers due to inadequate financial resources. In such cases, schools often employ persons without certification as substitute teachers, resulting in low-quality teaching. For educational standards in rural areas to be improved, training of substitute teachers and in-service training is necessary in addition to the construction of school buildings.

Furthermore, in spite of a strong desire for education in developing countries, even the minimum opportunities for education are neither guaranteed for all local people, nor are the people able to appropriately utilize such opportunities<sup>116</sup>. These situations show that there are not only educational sector problems with educational services and teaching materials, but also economic problems, restricting access to schools, and social problems stemming from customs and values, and health and nutrition conditions among others. Therefore, it is important to create an environment where children can attend school.

Literacy education for adults and citizenship education such as seminars for improvement of living conditions should also be considered in the future adult education activities. Finally, the above-mentioned educational approaches should not be implemented individually but combined to be most effective. For example, constructed school buildings can be utilized for supplementary instruction and literacy education.

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<sup>116</sup>JICA (2000)

### 5.4.3 Partnership Programs are Noteworthy

Literacy is essential for participation in modern economic activities and has a strong impact on poverty reduction, but sufficient attention to the planning stages is necessary to prevent expansion of existing social gaps (gender, ethnic minorities, the most impoverished groups, etc.) by focusing on specific groups<sup>117</sup>.

In the *DAC Guidelines on Poverty Reduction*, “protective capabilities” are referred to as “human capabilities to protect oneself from various kinds of suffering such as starvation, natural disasters, conflicts, crimes, violence, diseases, and so on.”. Natural disasters such as floods and desertification seriously damage economic and social infrastructure such as roads, irrigation systems, cultivated lands, forests, and so on. Therefore, such issues are an important component in rural development activities. Furthermore, because impoverished people in rural areas are most vulnerable to natural disasters, as cultivated land can be easily damaged from floods, erosion and sediment control as well as the conservation of the natural environment are important measures in reducing poverty.

People in poverty cannot help depriving natural resources and also, they easily worsen environment because of lack of financial and psychological afford to concentrate on environmental conservation. Their environmental aggravation then causes food shortages, worsening the poverty situation<sup>118</sup>.

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<sup>117</sup>JICA (2000)

<sup>118</sup>JICA (2000)

The vicious circle of poverty and environmental aggravation must be ended. For project effects to become sustainable, activities, which do not harm the environment, should be emphasized. These are some of the reasons for conservation of the natural environment within rural development projects. The protection of forests is effective in not only alleviating natural disasters such as floods but also in protecting the land from topsoil erosion and maintaining or improving productivity.

The natural environment can be conserved by preserving and rehabilitating existing natural resources (land and soil preservation and water-resource and forest-resource conservation) for improvement against natural disasters (flood, drought, etc.). JICA's activities in this field focus mainly on forest conservation, eco-friendly agriculture, and flood, erosion, and sediment control.

Governments in developing countries cannot fully implement public works on flood and erosion controls due to the lack of budget and human resources. Community participation on flood and erosion controls should be promoted as well as technical transfer to local engineers. The introduction of low-cost construction techniques using local gravel and stones may also be effective.

#### **5.4.4 Conclusion**

Electricity access is critical for the social and economic development of Uganda. Electricity access in Uganda is still very low at about 20% for all forms of energy. This very low level of access is an impediment to achieving social and economic transformation of the country. Electricity access targets, as

spelt out in the government major development plans, are to be achieved under the electricity connection policy (ECP).

Therefore, the Integrated Rural Development Theory and Aspects of Sustainable Energy Theory are pre-requisites for Renewable Energy Utilization. Three prominent themes of energy which can be labelled: energy security, energy sustainability, and energy poverty have been discussed. Uganda generally falls in the category of energy poverty which refers to the lack of adequate modern energy for the basic needs of cooking, warmth and lighting, and essential energy services for schools, health centres and income generation.

Renewable energy technologies have an important role to play in Africa's energy sector. With the right approach, the renewable energy industry in Africa can become a major player in the energy sector, and meet the energy needs of a significant proportion of the population. Renewable energy technologies can play a major role in national development in terms of job creation and income generation as well as providing an environmentally sound energy service. Aggressive lobbying for renewables at national, regional and sub-regional levels is required.

## **5.5 The Global Challenge: The path towards Sustainable Development**

The UN sees transitioning to clean, sustainable energy as fundamental to continued human prosperity over the coming century<sup>119</sup>. And yet, 1 in 5 people lack access to modern electricity, while 3 billion people still use kerosene,

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<sup>119</sup>United Nations Sustainable Development, Goal 7: Ensure Access to Affordable, Reliable, Sustainable and Modern Energy for All Webpage <http://www.un.org/SustainableDevelopment/Energy/Page/3/>

wood, coal, or even dung for cooking and heating<sup>120</sup>. The poorest in the world are the least likely to have access to a source of power, and are much more likely to remain poor as long as they are not connected<sup>121</sup>.

It's not simply a question of access, it's about ensuring the quality, reliability, safety and affordability of the energy services that power homes and essential community services, such as schools and clinics, as well as economic activity<sup>122</sup>. The productive use of renewable energy in rural areas can often reduce the absolute costs for energy consumed<sup>123</sup>, and help to raise incomes and improve health, providing power to pump water for irrigation, to process crops and power cottage industries, whilst at the same time reduce deforestation from logging for firewood.

People across the world are impacted by the effects of climate change, and it's the production and use of energy that makes up two-thirds of all GHG emissions. Furthermore, by 2030 global demand for energy is expected to rise by 20-35%<sup>124</sup>. Already, global electricity consumption per person has more than doubled since 1970s<sup>125</sup>.

I asked one of the top managers in Margic Uganda Limited about how best we can solve the problem of energy related emissions.

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<sup>120</sup>Ibid

<sup>121</sup>Indrawati, S. (2015): What You Need to Know About Energy and Poverty, World Bank Blog, 2015 <http://blogs.worldbank.org/voices/what-you-need-know-aboutenergy-and-poverty>

<sup>122</sup>Cafod, Measuring What Matters in The Energy SDG, 2015 <http://bit.ly/1qiiduq>

<sup>123</sup>World Economic Forum And PWC, Scaling Up Energy Access Through Cross-Sector Partnerships, 2013 <http://pwc.to/1pk8mx1>

<sup>124</sup>Global Commission on The Economy and Climate, Better Growth, Better Climate: The New Climate Economy - The Synthesis Report, 2014 <http://www.eesc.europa.eu/resources/docs/nce-synthesis-report-web-share.pdf>

<sup>125</sup>International Energy Agency, Energy Technology Perspectives. Harnessing Electricity's Potential Factsheet, 2014 [https://www.iea.org/media/news/2014/ETP14\\_Factsheets.Pdf](https://www.iea.org/media/news/2014/ETP14_Factsheets.Pdf)

He replied that *in order to address energy-related emissions, we must invest in low carbon technologies and energy efficiency. Ultimately, to fully implement 180 plus national action plans submitted to the UN in 2015 a cumulative investment of \$13.5trillion in low carbon technologies and energy efficiency until 2030 is needed. The challenge is huge: to decarbonise the global electricity supply, at least 65% must be generated from renewables by 2050<sup>126</sup>. Investment is also needed to improve the rate of energy efficiency gains.*

As the world heads down a path of decarbonisation, research predicts that on average the cost of electricity generation will rise by 30% to 50% by 2050. To meet a 2-degree limit to global warming (see SDG 13), we could see the cost of electricity rise at a much faster rate. To limit this cost increase, we must invest in technology innovation which will lower the cost of generation and improve energy efficiency, which could in turn reduce demand in countries with high energy consumption.

## **5.6 General Discussions of Findings**

I asked one of the legal officers in the Ministry of Energy and Mineral Development (MEMD) about government's role and plan in the promotion of renewable energy. This is what he had to say;

*'The Government of Uganda has taken a conscious effort to develop renewable energy resources as an integral part of the country's energy future. The*

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<sup>126</sup>International Energy Agency, Energy Technology Perspectives. Harnessing Electricity's Potential Factsheet, 2014  
[https://www.iea.org/media/news/2014/Etp14\\_Factsheets.Pdf](https://www.iea.org/media/news/2014/Etp14_Factsheets.Pdf)

*promotion of renewable energy is specifically included in the Government's Rural Electrification Strategy and Plan (RESP) (2001 - 2010) as one of the most important objectives of the strategy. The most vivid step forward has been the inclusion of the development of renewable energy (excluding large hydropower) to increase power generation as a key indicator of achieving rural transformation in the 10-year Energy for Rural Transformation (ERT) Programme.'*

At the headquarters of UMEME, I asked the Senior Project Coordinator for the Energy sector in the ministry about the percentage of electricity distribution in Uganda. He said,

*'Electrification access in Uganda is still very low, standing at approximately 9% nationally and 3% in rural areas, electrification of most parts of the country through grid extension in the near future is still a far cry. It is, therefore, within this context that Government is promoting the decentralized (distributed), off-grid electricity supply model for remote areas. In most of these cases the required electricity needs will be met by the deployment of locally available renewable energy sources of small hydro, solar energy, wind and biomass resources. The focus on decentralized supply systems is also more likely to achieve the objective of equitable regional distribution access to electricity, than if only the grid solution was pursued.'*

Currently, Uganda is experiencing an unprecedented electricity deficit of about 165 MW, resulting into massive load shedding, due to the prolonged drought, inadequate investment in least cost generation capacity and a relatively high load growth. This has forced the country to resort to the installation of very

expensive thermal generation, while awaiting the construction and commissioning of the 600 MW Karuma project. As one of the strategies to bridge the deficit and also for long term diversification of generation sources, Government has decided to accelerate the development of grid connected small renewable energy generation projects to reinforce the grid. This effort is being supported by the establishment of a Standardized Power Purchase Agreement (PPA) and a Feed-in Tariff, which are part of this Renewable Energy Policy framework, to help expedite transactions.

Apart from promoting accelerated power generation from renewable energy, the Energy Policy for Uganda (2002) has, among its objectives, emphasized the development, adoption and utilization of other modern fuels and technologies, including those based on renewable energy sources, in order to achieve the objectives of emission reduction, protection of the environment and energy conservation. Furthermore, the escalating prices of fossil fuels on the world market make it imperative for Government to promote the development and utilization of renewable energy resources and the associated technologies.

I interviewed the Human Resource Manager of Kirchner Solar Energy Uganda Limited about the which other modern fuels Uganda intends to use to promote sustainable renewable energy. He stated *'Apart from using the power generated, Uganda intends to use biomass fuels like ethanol, biodiesel, biogas and methanol; modern biomass technologies like efficient stoves and kilns and solar water heating.*

The Renewable Energy Policy is therefore, an elaboration of how Government will develop the necessary initiatives to create a demand for a wide range of renewable energy services.

The commitment of Government to develop the use of renewable energy sources is clearly aimed at creating the means of socio-economic development, especially by transforming the rural areas. The implementation of the policy's objectives will, therefore positively respond to the various legal and policy instruments and programmes, which Government has put in place to address poverty issues, catalyse industrialization and protect the environment

## **5.7 Recommendations for Enhancing Uganda's Energy Transition Framework**

### **5.7.1 Legal and Institutional Framework**

Strengthening enforcement of the legal and institutional framework to ensure safe and healthy working conditions to avoid occupational diseases and injuries and also provide liability for damage due to non-compliance to laws such that defaulters are held liable.

Pro-active and long-term policy-oriented renewable energy programmes aimed at senior decision-makers in both Government and the private sector should be initiated. The innovative energy policy programme of the African Energy Policy Research Network (AFREPREN/FWD) provides a model<sup>127</sup>. The policy programmes should be designed to demonstrate the economic and environmental benefits of renewable technologies to Africa's poor and

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<sup>127</sup>Stephen Karekezi And Waenikithyoma (2003): Renewable Energy Development; The Workshop for African Energy Experts on Operationalizing the NEPAD Energy Initiative Operationalizing the NEPAD Energy Initiative- Novotel, Dakar, Senegal

propose short- and medium-term policy initiatives that would engender large-scale dissemination of renewable. Priority should be given to highlighting the real and tangible economic benefits (such as job creation and income generation) that renewable energy programmes can deliver to the region at both the micro and macro levels. For example, renewable energy technologies are generally more labour-intensive than conventional and centralised energy projects and can help to address problems of employment of the urban and rural poor. Empirical data and information on this would possibly result in higher budgetary allocations to the development of RETs.

Of particular interest to policy-makers in sub-Saharan Africa would be revenue neutral policy and institutional measures. For example, it is possible to make the case that the loss of revenue associated with the removal of duties and taxes on renewable energy technologies such as wind pumps can be recouped from the long-term savings in imports of petroleum fuels that require scarce convertible currencies as well as from the income and sales tax remittances from a large and functional wind pump industry.

### **5.7.2 Environmental Regulation Training**

Environmental regulation training and awareness for RET implementers and different bodies involved to enable the main players to acquire knowledge about environmental standards. Train the People of Uganda generally to use the resources (abundant animal products and farm products) to generate renewable energy for consumption.

The introduction of unfamiliar technologies such as RETs requires the development of technical skills. The importance of technical know-how in the

increased utilization of RETs has been recognized in the region, but in spite of efforts by governments, there is a continuing shortage of qualified personnel<sup>128</sup>. Technical knowledge is important in order to build over the long term, a critical mass of professional African policy analysts, economic managers and engineers who will be able to manage all aspects of the RET development process and to ensure effective utilization of already trained African analysts and managers<sup>129</sup>. Trained manpower capable of developing and manufacturing renewable energy technologies is a prerequisite for their successful dissemination.

### **5.7.3 Identification of Potential Hazards**

Potential hazards of Renewable Energy should be identified. The scope of the identification should encompass all activities from inception through to decommissioning. Identify potential hazards and develop hazard-specific control mitigation mechanisms and strengthening civil society organizations to ensure that there is a follow up to check on non-compliance to environmental standards.

### **5.7.4 Enhance synergies between measures to promote renewable energy**

There is need to enhance synergies between measures to promote renewable energy and trade law. It is crucial to design the FIT consistent with trade law that will reflect consideration of legitimate policy objectives on trade rules, especially Subsidies and Countervailing Measures (SCM agreement); Desirable

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<sup>128</sup>Mosimanyane, M.T., Zhou. P And Kgathi, D.L., 1995. Renewable Energy Technologies in Botswana – The Case of Wind Energy for Water Pumping. Sei/Afrepre/Fwd, Draft Report.

<sup>129</sup>World Bank, 1996.African Development Indicators 2003. Washington Dc: The World Bank

to have Ex ante international rules in addition to ex post solution by dispute settlement bodies; For the sake of legal certainty and predictability.

#### **5.7.5 Poverty Eradication**

It is critical that the rural population be trained on poverty eradication methods so that they will be able to afford the electricity being extended to them by government. Off-grid solutions are emerging as an important driver of rural electricity access<sup>130</sup>. Emerging evidence suggests off-grid solar electricity reaches about 141 million people in rural areas in the developing world, complementing grid electrification. Uptake is highly concentrated in about a dozen pioneering countries. However, affordability remains a key concern<sup>131</sup>. Estimates suggest that, even in countries with universal access, affordability concerns affect about 30 percent of the population; in countries working toward universal access, affordability affects 57 percent of those who already have access.

#### **5.7.6 Financial Barriers**

Financing plays a major role in the formulation of RET policies. Studies have shown that one of the main obstacles to implementing renewable energy projects is often not the technical feasibility of these projects but the absence of low-cost, long-term financing. This problem is complicated by competition for limited funds by the diverse projects and becomes critical if the country is operating under unfavourable macro-economic conditions. Governments and private enterprises must therefore seek creative ways of

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<sup>130</sup>2018 HLPF Review of SDG Implementation: SDG 7- Ensure Access to Affordable, Reliable, Sustainable and Modern Energy for All

<sup>131</sup> Ibid

financing RETs projects. The challenge of financing projects for RETs is to develop models that can provide these technologies to consumers (including the very poor) at affordable prices while ensuring that the industry remains sustainable. As shown earlier, limited policy support for RETs in the region is indicated by minimal budget allocation to renewables at government level. Consequently, the private sector is left to bear the burden of financing RETs.

Most advanced and electrical RETs are not affordable to majority of the population in Africa who are poor, with national poverty levels of 50-70%. This is especially true for RETs that have high cost imported components, then for those that can be locally manufactured and assembled using locally available components. RETs with high cost imported components place an additional burden on foreign exchange reserves of Africa countries, which are often minuscule and nearing exhaustion, and require expensive financing schemes and large subsidies<sup>132</sup>. These subsidies are not sustainable in the long run, unless the technologies provided are designed to include income generation.

Banking institutions have unfavourable requirements for RETs financing. Banking institutions normally lay down strict conditions for RETs investors and this deters potential users. Conditions required included a feasibility study conducted at the applicant's expense, due to the limited knowledge on renewables by banks. In addition, the banks required land titles as collateral, port folios of project sponsors and managers, data on past and current operations, approximate value of existing investment, a valuation report, raw

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<sup>132</sup> Ibid

material procurement plans, and the marketing strategy for the finished product<sup>133</sup>.

In cases where financing mechanisms are provided for end users, these are often not within the reach of the majority of the population. For example, the UNDP/GEF PV project in Zimbabwe benefited mainly affluent rural households, since over 80% of rural population could not afford the smallest system even at the cheapest rates. Stringent requirements for loan applications excluded the majority of the rural population from qualifying<sup>134</sup>. In another study on the viability of PV in Manicaland, Zimbabwe, 65% of the rural population could not afford to pay the solar service fee (the lowest cost possible for providing PV-based electricity), while 91.5% could not afford a credit scheme<sup>135</sup>.

### **5.7.7 Innovative Financing Mechanisms**

Priority should be given to the establishment of innovative and sustainable financing programmes for renewable energy technologies. This may range from the creation of a National Fund for renewable energy projects financed by a modest tax on fossil fuels to credit schemes specifically aimed at developing renewable energy industries and endowment funding of renewable energy agencies.

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<sup>133</sup>Ward, R. F., Ashworth, J. H., Burrell, G., 1984. Renewable Energy Technologies in Africa: An Assessment of Field Experience and Future Directions. Bureau For Africa/Agency for International Development. Washington.

<sup>134</sup>Mbewe, A. (2000). Renewables And Energy for Rural Development Theme Group: Data and Statistics Compilation - Zimbabwe. African Energy Policy Research Network (Afrepren/Fwd), Nairobi.

<sup>135</sup>Chiwaya, A., 2001. Energy Sector Reform Theme Group: Data and Statistics Compilation – Malawi. African Energy Policy Research Network (Afrepren/Fwd), Nairobi, Kenya.

Experience has shown that most renewable energy technologies (especially those that can be locally manufactured) require subsidies only in the initial stages, and can become financially sustainable in the short to medium term after a certain level of technology dissemination has been attained. After attaining a dissemination of certain critical mass number of units and assemblers / manufacturers, the renewable energy industry can become self-sustaining and subsidies can be gradually withdrawn without any adverse effects on continued dissemination of renewable energy technologies.

In Ghana, a national energy fund has been successfully utilised to finance renewable energy projects and energy efficiency activities on a sustainable basis. An important challenge is the bundling of discrete renewable energy projects into large programmes, which can be financed by major bilateral and multilateral donor and financing agencies. In order to increase access to loans, banks should find alternatives to stringent requirements e.g. the collateral requirements. But since bank policy is unlikely to change in the near future, one possibility is to encourage potential consumers to form self-help groups or cooperatives so that they can acquire loans through cooperative banks, most of which do not have stringent collateral requirements. In addition, small credit institutions (micro-finance institutions) could provide financing for RETs investors and users at affordable and accessible terms. Small-credit institutions are crucial in ensuring continuity when external support ceases. Many have a nationwide network in place and are able to provide service even to remote rural areas.

### **5.7.8 Loans for Investment.**

African Development Bank has agreed to give soft loans for RETs at an interest rate of 10% or less up to a total of US\$ 1 million per applicant for identified project (s) for investment<sup>136</sup>. Possible projects could include **Clean Renewable Energy** projects and **Carbon Finance** projects. These are projects that reduce GHG emissions. The rationale is that emissions reduction is less costly in the developing countries.

### **5.7.9 Way Forward on Oil Exploitation Impacts on Sustainable Development.**

Globally, there is increasing recognition of the benefits of transparency in public data and ever greater momentum towards reform. It is essential that citizens are able to access and understand extractive contracts agreed by their governments in their names, in order to ensure that the public obtains the fullest benefit possible from exploitation of their nation's natural resource wealth. It is also important to ensure that current requirements on politicians and public officials to declare any business interests are met and agree a process to investigate and address potential conflicts of interest. This is particularly true of the extractive sector, with civil society groups, governments and parliamentarians contributing to a growing movement against opacity and towards improved governance.

### **5.7.10 Way Forward on Renewable Energy Initiatives**

Renewable energy technologies have an important role to play in Africa's energy sector. With the right approach, the renewable energy industry in Africa can become a major player in the energy sector, and meet the energy

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<sup>136</sup> Rea Report 2019

needs of a significant proportion of the population. Renewable energy technologies can play a major role in national development in terms of job creation and income generation as well as providing an environmentally sound energy service. Aggressive lobbying for renewable energy at national, regional and sub-regional levels is required.

Renewables can play complementary roles to large-scale conventional energy technologies. For example, RETs can be important alternatives for power generation in many drought-prone countries, when the conventional electricity sector (largely hydro-based) experiences deficits. Geothermal (Kenya) and Cogeneration (Mauritius) ably met the energy deficit during the drought periods in Mauritius in 1999 and in Kenya between 1998-2000<sup>137</sup>. During the 2-year drought, the two geothermal power plants at Olkaria, Kenya offered continuous base-load power with almost 100% availability, unaffected by the prevailing weather condition<sup>138</sup>. In Mauritius, energy from sugarcane bagasse increased from 259 GWh in 1998 to 343 GWh in 1999.

The architects of the NEPAD energy program should ensure that the needs of the majority of Africa's population are not forgotten and are assured the requisite level of policy attention and eventual program and project finance. Of particular interest to Africa would be renewable energy projects that promote local, small and micro-level enterprises as well as provide employment to rapidly growing population of Africa. To ensure that Africa's

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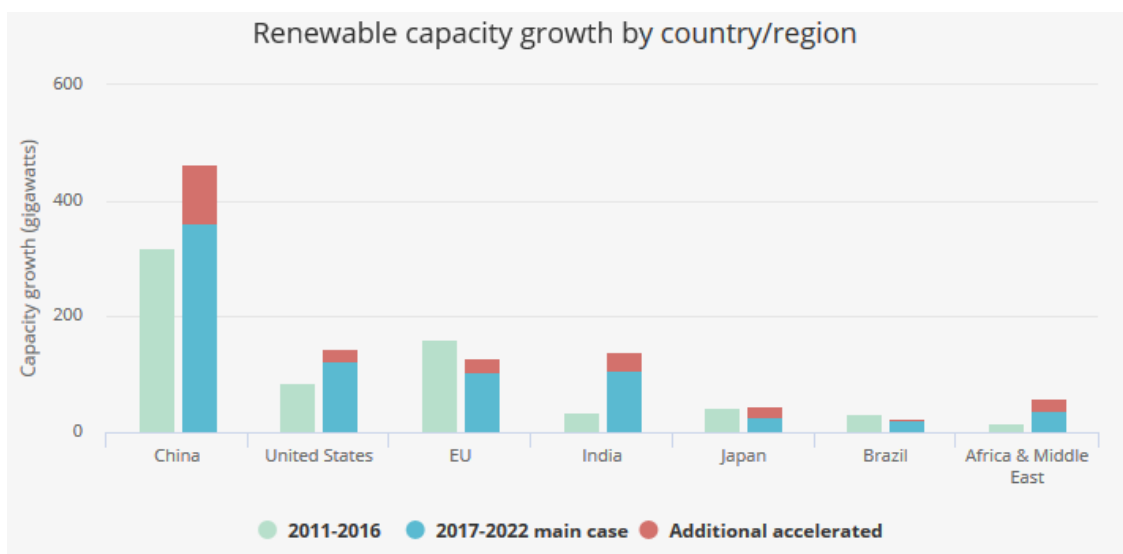
<sup>137</sup> Stephen Karekezi, *Poverty and Energy in Africa: A Brief Review on Energy Policies and Strategies* (United Nations, 2002) <https://www.un.org/esa/sustdev/sdissues/energy/op/nepadkarekezi.pdf> accessed 21 April 2023

<sup>138</sup>Bronicki, L. Ormat's (2002): *Experience in Implementing Geothermal Projects. The Example of Olkaria Iii*. Ormat International, Inc.

energy community is able to exploit the unique opportunity that NEPAD provides for the development of renewable in Africa, the following multi-pronged strategy is proposed: A near-term fast track program (1-5 years) that would aim to implement low-risk and low-cost near-term initiatives; and a long-term track program (5-10 years) that is built around major renewable energy sector initiatives that are currently taking place.

The near-term fast track program would consider implementation of projects that have proven track records and that maximise the use of local resources, expertise and available grant finance. Some of the aforementioned barriers to RETs development could also be addressed in the near term. Typical projects that could be implemented under such a program would include the following: Biomass-based co-generation; geothermal energy; and Small-scale renewables (improved cook stoves and kilns, solar dyers, solar water heaters, wind pumps, small hydro)

The long-term track program would build on successes from the near-term fast track program to develop medium and long-term initiatives. It would rely largely on ongoing and planned energy sector reform to establish an



enabling environment that would attract both bilateral/multilateral as well as private finance for major investments in both national and regional RETs projects. Examples of such projects include: Large-scale wind power projects; large scale urban waste-to-energy projects; and Long-term capacity building & training, policy and financing programs.

*Figure 2: Renewable Energy Capacity Growth by Country/Region*

It is noteworthy that in India 90% of the growth capacity is in solar PV and wind energies with the world's lowest prices for both technologies. This will be discussed in detail and also in relation to other RE consuming states.

## **5.8 Conclusion**

In conclusion, this thesis provides a comprehensive analysis of Uganda's energy transition from a legal perspective, shedding light on the complex interplay between environmental sustainability, economic development and renewable energy governance. The discussion traverses a diverse array of legal and non-legal considerations, spanning constitutional mandates, statutory provisions, policy frameworks and institutional arrangements.

Through a meticulous examination of Uganda's energy laws and policies, this study underscores the imperative of legal reforms to facilitate a smooth transition towards renewable energy sources. By critically evaluating the legal frameworks governing renewable energy adoption and environmental compliance, the research identifies gaps, challenges, and opportunities for enhancing regulatory effectiveness and promoting sustainable development.

Furthermore, the thesis offers pragmatic recommendations aimed at strengthening Uganda's renewable energy initiatives, improving electricity access, enhancing household income, and fostering social and economic development. By leveraging international best practices and lessons learned from global experiences, these recommendations seek to inform policy discourse and guide strategic interventions in Uganda's energy sector.

In essence, this thesis serves as a catalyst for informed policymaking, institutional reform, and scholarly inquiry, paving the way for a greener, more sustainable energy future in Uganda. As the nation navigates the complexities of its energy transition, the insights and recommendations presented herein provide a roadmap for achieving environmental resilience, economic prosperity and inclusive development in the years to come.

## **ANNEX A: STRUCTURED QUESTIONNAIRE**

### **Introduction:**

Thank you for participating in this research endeavour. The objective of this questionnaire is to gather valuable insights regarding the legal framework for sustainable energy practices in Uganda. Your expertise and experiences are invaluable in shaping the understanding of the legal landscape concerning energy transitions. Please respond candidly, as your inputs will significantly contribute to this study.

### **Section 1: General Information**

1. Name:
2. Position/Title:
3. Organization/Institution:
4. Years of Experience in Energy Policy/Law:
5. Contact Information (optional):

### **Section 2: Understanding of Energy Transition Policies**

1. How would you define 'sustainable energy practices' within the context of Uganda's legal framework?
2. From your perspective, what are the primary legal barriers hindering the widespread adoption of sustainable energy practices in Uganda?
3. Can you highlight any successful legal mechanisms or policies that have positively influenced sustainable energy practices in Uganda?

4. In your opinion, what role does the legal framework play in incentivizing private sector participation in renewable energy initiatives in Uganda?
5. How do you envision the alignment between Uganda's existing legal framework and international standards for sustainable energy practices?

### **Section 3: Assessment of Current Legal Framework**

1. Could you identify specific legislation or policies that have effectively catalysed the advancement of sustainable energy practices in Uganda? Please elaborate.
2. Conversely, are there any specific legal gaps or deficiencies inhibiting the progress of sustainable energy initiatives? If yes, please provide detailed examples.
3. How would you assess the effectiveness of current legal provisions in addressing environmental concerns related to energy production and consumption in Uganda?
4. In your experience, how adaptable is the current legal framework to technological advancements and emerging trends in renewable energy sources?
5. What institutional or regulatory reforms do you believe could bolster the legal framework's support for sustainable energy projects in Uganda?

### **Section 4: Effectiveness of Policy Implementation**

1. How would you evaluate the efficacy of existing energy transition policies in achieving environmental sustainability in Uganda?

2. In your view, how has the legal framework contributed to the economic viability of sustainable energy projects in the country?
3. What obstacles, if any, have hindered the full implementation and enforcement of sustainable energy policies at a national level?
4. From your expertise, what legislative or policy amendments could fortify the legal framework to promote more inclusive and equitable access to sustainable energy sources in Uganda?
5. Can you suggest strategies to strengthen the enforcement mechanisms of existing legal provisions pertaining to sustainable energy practices?

#### **Section 5: Future Perspectives and Recommendations**

1. What foreseeable legal challenges might emerge concerning future energy transition initiatives in Uganda?
2. Based on your expertise, what legislative or policy measures could enhance public-private partnerships in the realm of sustainable energy projects?
3. How might the legal framework better facilitate research and development efforts aimed at advancing renewable energy technologies within Uganda?
4. What steps or initiatives would you propose to ensure a smoother integration of decentralized renewable energy systems into Uganda's legal framework?

5. Considering your insights, what overarching recommendations would you suggest to policymakers to foster a more robust legal ecosystem supporting sustainable energy initiatives in Uganda?

**Conclusion:**

Your participation and insights are immensely appreciated. If you have any additional comments or suggestions related to sustainable energy practices or the legal framework, please feel free to share them here.

## **ANNEX B: INTERVIEW GUIDE**

### **Semi-Structured Interview Guide for Sustainable Energy Practices in Uganda**

#### **Introduction:**

Thank you for agreeing to participate in this interview. The purpose of this discussion is to delve into the legal framework surrounding sustainable energy practices in Uganda. Your insights and expertise are invaluable in shaping the understanding of legal aspects related to energy transitions. This interview will explore various dimensions of the legal landscape, and your candid responses will significantly contribute to this study.

#### **Section 1: Background Information**

1. Could you please provide an overview of your role and responsibilities concerning energy policies or legal frameworks in Uganda?
2. How long have you been involved in energy policy/law-related activities?

#### **Section 2: Understanding of Sustainable Energy Practices**

1. From your perspective, how would you define 'sustainable energy practices' within the legal context of Uganda?
2. What, in your opinion, are the primary legal challenges hindering the extensive adoption of sustainable energy practices in Uganda?
3. Can you highlight any legal mechanisms or policies that have notably influenced sustainable energy practices positively? Could you provide examples?

4. How significant is the legal framework in encouraging private sector involvement in renewable energy initiatives in Uganda?
5. How would you describe the alignment between Uganda's current legal framework and international standards for sustainable energy practices?

### **Section 3: Assessment of Existing Legal Framework**

1. Could you identify specific legislation or policies that have effectively propelled the advancement of sustainable energy practices in Uganda? Please elaborate on their impact.
2. Conversely, are there any notable legal gaps or deficiencies impeding the progress of sustainable energy initiatives in Uganda? Can you provide specific instances?
3. How effective are the existing legal provisions in addressing environmental concerns associated with energy production and consumption in Uganda?
4. In your experience, how adaptable is Uganda's legal framework to accommodate technological advancements and emerging trends in renewable energy sources?
5. What reforms, either institutional or regulatory, do you believe could bolster the legal framework's support for sustainable energy projects in Uganda?

### **Section 4: Policy Implementation and Challenges**

1. How would you evaluate the efficacy of current energy transition policies in achieving environmental sustainability in Uganda?

2. From a legal standpoint, how has the existing framework contributed to the economic viability of sustainable energy projects in Uganda?
3. What barriers have hindered the comprehensive implementation and enforcement of sustainable energy policies at a national level?
4. In your view, what legislative or policy amendments could enhance the legal framework to promote more inclusive access to sustainable energy sources in Uganda?
5. Can you suggest strategies to reinforce the enforcement mechanisms of existing legal provisions related to sustainable energy practices?

#### **Section 5: Future Perspectives and Recommendations**

1. What legal challenges do you foresee emerging concerning future energy transition initiatives in Uganda?
2. Based on your expertise, how can legal frameworks encourage more effective public-private partnerships in the realm of sustainable energy projects?
3. How might the legal framework better facilitate research and development efforts aimed at advancing renewable energy technologies within Uganda?
4. What steps or initiatives would you recommend to facilitate the seamless integration of decentralized renewable energy systems into Uganda's legal framework?
5. Considering your insights, what overarching recommendations would you propose to policymakers to foster a more robust legal ecosystem supporting sustainable energy initiatives in Uganda?

**Conclusion:**

Your participation and invaluable insights in this interview are deeply appreciated. If you have any additional comments or suggestions related to sustainable energy practices or the legal framework, please feel free to share them here.

## **ANNEX C: REVIEW CHECKLIST**

### **Review Checklist for Analysing Legal Sources on Energy Transitions**

#### **Introduction:**

This checklist aims to facilitate the systematic review and analysis of statutes, legal texts, case laws, and scholarly articles pertinent to energy transitions and their legal implications. By employing this checklist, the process of organizing and synthesizing information extracted from various sources will be streamlined and structured.

#### **Section 1: Statutory Analysis**

- a. Identification of Relevant Statutes: List the statutes directly related to energy transitions in Uganda.
- b. Key Provisions and Amendments: Highlight significant provisions and any recent amendments relevant to energy transition policies.
- c. Legal Responsibilities and Rights: Outline legal responsibilities and rights conferred by the identified statutes on stakeholders involved in energy transitions.
- d. Comparative Analysis: Consider comparative analysis with international statutes promoting sustainable energy practices.

#### **Section 2: Analysis of Legal Texts**

- a. Identification of Pertinent Legal Texts: List and categorize legal texts (regulations, directives, policies) influencing energy transition policies.
- b. Thematic Analysis: Identify and categorize key themes within the legal texts concerning sustainable energy practices.

- c. Legal Interpretation: Analyse interpretations and implications of legal texts concerning energy transition and renewable energy policies.
- d. Compliance and Enforcement Mechanisms: Assess mechanisms ensuring compliance and enforcement of legal texts in the energy sector.

### **Section 3: Case Law Examination**

- a. Selection of Relevant Case Laws: Identify key court cases relevant to energy transitions and renewable energy initiatives.
- b. Precedents and Rulings: Summarize precedents set and significant rulings in cases impacting energy transition policies.
- c. Legal Interpretation and Implications: Evaluate the legal interpretation and implications derived from the analysed case laws.
- d. Impact on Policy Development: Assess the influence of case laws on the development and evolution of energy transition policies.

### **Section 4: Review of Scholarly Articles**

- a. Identification of Scholarly Articles: Compile a list of scholarly articles, academic papers, and publications addressing energy transitions.
- b. Key Findings and Analyses: Summarize the main findings and analyses presented in the scholarly articles.
- c. Perspectives and Recommendations: Extract diverse perspectives and recommendations offered by scholars concerning legal implications and improvements in energy transition policies.
- d. Relevance and Contribution: Evaluate the relevance and contribution of each scholarly article to the understanding of legal implications in energy transitions.

**Conclusion:**

- a. Ensure completeness and accuracy in the review process by cross-verifying the extracted information from statutes, legal texts, case laws, and scholarly articles.
- b. Organize and synthesize the information gathered using this checklist to aid in the creation of a comprehensive analysis of energy transitions and their legal implications in Uganda.

## **ANNEX D: RESEARCH CHECKLIST**

### **Research Planning:**

- a. Clearly define the research objectives and questions.
- b. Establish the scope and boundaries of the study.
- c. Identify key legal experts, policymakers, and stakeholders for interviews and surveys.

### **Literature Review:**

- a. Conduct a thorough review of existing literature on sustainable energy practices and legal frameworks in Uganda.
- b. Identify gaps, trends, and key concepts relevant to the research.

### **Methodology:**

- a. Develop a detailed research methodology, including the use of doctrinal legal research and qualitative data analysis.
- b. Prepare instruments, including a structured questionnaire and semi-structured interview guide.
- c. Ensure ethical considerations are incorporated into the research design.

### **Data Collection:**

- a. Administer the structured questionnaire to selected participants.
- b. Conduct semi-structured interviews with legal experts, policymakers, and stakeholders.
- c. Use purposeful and convenience sampling techniques as outlined in the methodology.

**Data Analysis:**

- a. Perform qualitative data analysis, focusing on thematic identification and interpretation.
- b. Evaluate the effectiveness of current energy transition policies.
- c. Identify legislative gaps and areas for potential improvement.

**Legal Framework Assessment:**

- a. Evaluate existing legal frameworks supporting sustainable energy practices.
- b. Examine the alignment with international standards and best practices.
- c. Identify specific laws, regulations, and policies that impact sustainable energy projects.

**Recommendations and Future Perspectives:**

- a. Propose recommendations based on research findings.
- b. Consider future perspectives and potential legal challenges in the energy transition landscape.
- c. Ensure recommendations align with the study's objectives and the identified gaps.

**Reporting:**

- a. Draft a comprehensive research report outlining the methodology, findings, and recommendations.
- b. Structure the report logically with clear sections for ease of understanding.
- c. Review and edit the report for clarity, coherence, and conciseness.

**Presentation and Dissemination:**

- a. Develop a clear and concise presentation summarizing key findings.
- b. Plan for the dissemination of research findings to relevant stakeholders.
- c. Consider avenues for academic publication or conference presentations.

**Conclusion:**

- a. Confirm that all aspects of the research plan, literature review, methodology, data collection, and analysis align with the research objectives.
- b. Verify that ethical considerations have been adhered to throughout the research process.

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