



# RESP

e-ISSN: 2979-9414



## Araştırma Makalesi • Research Article

# The Impact of AI on ECOWAS Energy Regulation Development

## Yapay Zekanın ECOWAS Enerji Düzenlemelerinin Gelişimine Etkisi

Klemens Katterbauer <sup>a, \*</sup>, Sema Yılmaz <sup>b</sup>, Hassan Syed <sup>c</sup> & Laurent Cleenewerck <sup>d</sup>

<sup>a</sup> Centre for Islamic Metafinance, Euclid University, Bangui, Central African Republic / Africa

ORCID: 0000-0001-5513-4418b

<sup>b</sup> Yıldız Technical University, İstanbul / Türkiye

ORCID: 0000-0002-3138-1622

<sup>c</sup> Centre for Islamic Metafinance, Euclid University, Bangui, Central African Republic / Africa

ORCID: 0000-0003-2114-2473

<sup>d</sup> Centre for Islamic Metafinance, Euclid University, Bangui, Central African Republic / Africa

ORCID: 0000-0002-9267-0428

### ANAHTAR KELİMELER

Enerji düzenlemeleri  
Yapay zeka  
Bölgesel elektrik otoritesi  
Çin YZ düzenlemeleri

### KEYWORDS

Energy regulations  
Artificial intelligence  
Regional electricity authority  
Chinese AI regulations

### ÖZ

ECOWAS Bölgesel Elektrik Düzenleme Kurumu (ERERA), Batı Afrika'daki sınır ötesi elektrik bağlantılarını denetlemekten sorumlu bölgesel kurumdur. ECOWAS üyesi devletlerin, bölgenin enerji kaynaklarının işbirliği içinde uygulanması ve paylaşılması yoluyla elektrik enterkoneksiyonlarını gerçekleştirme arzusu, Batı Afrika'nın elektrik endüstrisinin büyümesi için uygun kurumsal ve yasal çerçeveyi oluşturmayı amaçlayan bir Enerji Protokolü'nün kabul edilmesiyle kendini göstermiştir. Enerji Protokolü ve Batı Afrika Güç Havuzu (WAPP) Programı kapsamında ECOWAS Üye Devletleri, Ocak 2008'de ECOWAS'ın uzmanlaşmış bir kurumu olarak ECOWAS Bölgesel Elektrik Düzenleme Kurumu'nu (ERERA) kurmuştur. Yapay zekanın enerji sektörüne uygulanması, hem zorlu düzenleyici engeller hem de şimdiye kadar gerçekleşmemiş beklentiler sunmaktadır. YZ, akıllı şebekeleri geliştirirken ve petrol sondajında devrim yaratırken, hesap verebilirlik ve suçlulukla ilgili soruları da gündeme getirmektedir. YZ güdümlü bir geleceğe doğru ilerlerken, yasal, teknolojik ve etik konuların entegre edilmesinde işbirliği şarttır. Bu planı uygulayarak, YZ'nin enerji sektöründeki yıkıcı potansiyelinden yararlanabilir, riskleri azaltabilir ve adil ve sürdürülebilir bir enerji geleceği sağlayabiliriz.

### ABSTRACT

The ECOWAS Regional Electrical Regulatory Authority (ERERA) is the regional body responsible for overseeing cross-border electrical interconnections in West Africa. The desire of ECOWAS member states to realize electricity interconnections through the cooperative implementation and sharing of the region's energy resources is manifested in adopting an Energy Protocol, which aims to establish the proper institutional and legal framework for the growth of West Africa's electricity industry. Within the Energy Protocol and the West African Power Pool (WAPP) Program scope, the Member States of ECOWAS formed the ECOWAS Regional Electricity Regulatory Authority (ERERA) in January 2008 as a specialized institution of ECOWAS. Applying AI to the energy sector presents both challenging regulatory barriers and hitherto unrealized prospects. While AI enhances smart grids and revolutionizes oil drilling, it also raises questions about accountability and culpability. As we move toward an AI-driven future, collaboration in integrating legal, technological, and ethical matters is essential. By implementing this plan, we can leverage AI's disruptive potential in the energy sector, reduce risks, and ensure a fair and sustainable energy future.

## 1. Introduction

Artificial intelligence (AI) is driving a massive shift in the energy sector. Even though artificial intelligence (AI) has

enormous potential to optimize energy production, delivery, and consumption, its integration presents significant legal issues. The energy business continually develops, making navigation more difficult due to its complex regulatory

\* Sorumlu yazar/Corresponding author.

e-posta: katterbauer@euclidfaculty.net

Atıf/Cite as: Katterbauer, K., Yılmaz, S., Syed, H. & Cleenewerck, L. (2024). The Impact of AI on ECOWAS Energy Regulation Development. *Journal of Recycling Economy & Sustainability Policy*, 3(SI), 23-30.

Received 12 August 2024; Received in revised form 8 September 2024; Accepted 9 September 2024

This article is published under the Creative Commons Attribution (CC BY 4.0) licence. Anyone may reproduce, distribute, translate and create derivative works of this article (for both commercial and non-commercial purposes), subject to full attribution to the original publication and authors.

environment. In the legal energy business, artificial intelligence has surfaced as a viable remedy to tackle this issue. Smart grids, which are electrical supply networks that employ digital communications to monitor and respond to local variations in demand, can be significantly aided by AI technology. AI systems can forecast consumption patterns by evaluating past and current data, which helps utilities use resources more effectively (Niet, 2022). AI can also aid in efficiently distributing resources, especially in times of unexpectedly high demand. In these situations, artificial intelligence (AI) can enhance power distribution, directing it where it is most needed and reducing the chance of blackouts. However, the application of AI in smart grids brings up concerns about data security and privacy and accountability for AI-driven decisions that may result in outages (Ahmad, et al., 2021).

AI can be used by energy businesses to forecast when their equipment will break down or need maintenance. Machine learning can forecast probable malfunctions before they happen by evaluating vast volumes of data from many sources, including usage statistics, meteorological data, and previous maintenance records. This strategy lowers repair costs, minimizes downtime, and raises the overall dependability of the energy system. However, using AI algorithms to make crucial maintenance choices creates liability issues. The energy industry uses AI to evaluate real-time pricing, supply, and demand data to make lucrative trading decisions (Clarke, 2019). Because AI evaluates market volatility and uncertainty proactively, it is also very effective at risk management. AI-powered algorithmic trading is high-speed, completing many trades in milliseconds. It automates processes, simulates market situations, assesses sentiment, optimizes energy portfolios, and continuously adjusts to shifting market conditions. AI is invaluable in navigating the volatile energy market because of its remarkable pattern recognition capabilities, which allow it to spot patterns and trends in massive datasets (Pan, Ai, Li, Pan, & Yan, 2019). It can identify hazards and market opportunities that human traders might miss. AI has a big impact on the oil and gas exploration industry. Artificial intelligence (AI) can accurately evaluate enormous volumes of geological data, which allows it to find possible oil and gas reserves that conventional approaches could have overlooked (Kókuti, 2023). It also evaluates these deposits' viability, focusing exploration efforts on the most promising opportunities. This lowers needless expenses and prices while simultaneously increasing efficiency and the success rate of exploration activities. Because artificial intelligence (AI) differs from previous technologies in a number of essential ways, AI regulation creates particular issues. These difficulties make it more challenging to develop efficient legal frameworks to control the risks associated with AI (Dhabliya, 2024).

The ability of AI to function independently is one of its most unique characteristics. Without human assistance, AI systems can carry out complicated jobs like maintaining investment portfolios and operating automobiles. There are

important questions about accountability and control raised by this growing autonomy. The legal system needs to change to meet the challenges presented by these autonomous activities as AI systems assume increasingly complex functions. A critical concern about AI autonomy is predictability. Even the architects of AI systems cannot predict the behaviors and solutions these systems will create. For example, to optimize energy distribution and usage, Google's AI startup DeepMind announced in 2019 that it would be working with the UK National Grid (Fan, Ai, & Piao, 2018).

In an effort to boost productivity and cut expenses, the AI system employed machine learning to forecast power consumption and modify supply accordingly. In the process, the AI developed an amazing but efficient grid-balancing method. The AI system picked up on subtle patterns in energy consumption that human operators had missed (Baş & Demirtaş, 2022). In that instance, it made more accurate adjustments to power generation and distribution by discovering correlations between seemingly unrelated phenomena, such as weather patterns and energy use. As a result, energy waste was significantly reduced, and overall grid stability was increased. Furthermore, C-Path, an AI for cancer pathology, found surprising prognostic indications for breast cancer that went against accepted medical wisdom. These illustrations show how AI systems' computational capability and lack of cognitive biases enable them to produce solutions beyond human imagination (Shimizu & Nakayama, 2020). Because AI is unpredictable, it is challenging to predict its behavior, which makes determining who is responsible for harm caused more difficult. Legally speaking, the principles of foreseeability and causality are complicated by the unpredictable nature of AI acts (Stuurman & Lachaud, 2022). It becomes difficult to hold AI system creators accountable for any harm when the system behaves in ways the designers did not expect. This problem is made more difficult by the AI's ability to learn and adapt since its behavior may alter due to experiences gained after design. It is possible to see this unpredictability as an overriding cause that releases designers from responsibility while depriving sufferers of compensation (Veale & Zuiderveen Borgesius, 2021).

## 2. Literature review

Lessons from China's approach to implementing AI could help Africa navigate this space. China's AI market, valued at \$23.196 billion in 2021, is projected to triple to \$61.855 billion by 2025, with the Chinese government projecting that AI will generate \$154,638 million in income annually by 2030. However, China is not just interested in AI spreading and its creative applications. It has also been quietly setting the standard and leaving its stamp on the regulatory landscape for AI. China enacted and implemented three separate regulatory measures at the municipal, regional, and national levels in 2022. This trend continued into 2023 when China enacted national-level laws to crack down on deepfake and generative technology in just

January (Roberts, et al., 2021).

China's Deep Synthesis Provisions became operative on January 10, 2023, as a component of the government's endeavor to fortify its oversight of deep synthesis technology and services. The provisions cover "deep synthesis service users" (organizations and individuals that use profound synthesis to create, duplicate, publish, or transfer information) as well as "deep synthesis service providers" (companies that offer deep synthesis services and those that provide them with technical support). "Technologies utilizing generative and/or synthetic algorithms, such as deep learning and virtual reality, to produce text, graphics, audio, video, or virtual scenes" is how the regulations define profound synthesis (Smuha, 2021). Because of these laws' extensive reach, producing AI-generated material for 1.4 billion people will drastically alter. China's rule goes further than the UK's, which also plans to outlaw the production and distribution of deepfake videos without permission. The policy establishes guidelines for each step of the deepfake use process, including development, labeling, and distribution. Furthermore, the law allows for the possible suppression of naturally captured content. Being one of the first nations to impose a deepfake regulation, there are concerns about whether China will use this law to further police freedom of expression too extensively. Nevertheless, discussions about what can be done to address the harms advocated by this technology are reviving. Whatever your position on the matter, the legislation does establish a precedent that may be partially repeated in other legal systems. We will learn more specifics about implementing these laws this year (Tallberg, Lundgren, & Geith, 2024).

On March 1, 2022, the Internet Information Service Algorithmic Recommendation Management Provisions came into force. This law is comparable to the DMA and DSA laws passed by the EU. The guidelines, which China's Cyberspace Administration drafted, mandate that companies offering AI-based tailored suggestions in mobile applications respect user rights, such as shielding children from damage and enabling users to add or remove tags related to their traits. The three primary categories of the regulation's requirements are information service norms, user rights protection, and general provisions. Because they are expected to comply, the regulations impact US and foreign businesses that utilize algorithms and machine learning in their websites or applications operating in China. Several important clauses have to be taken into account (Sheehan, 2023).

Online service providers who also engage in online news must apply for special licensing under Article 13, which forbids the algorithmic creation of false information. Because it mandates that online service providers attend to the interests of senior consumers, particularly about fraud prevention, Article 19 provides additional protection for the elderly. Among many other things, the rule forbids phony profiles, faking traffic figures, and promoting material that

is addicting. Other less apparent clauses, which represent China's stance on AI ethics, require businesses to maintain conventional wisdom, spread good vibes with vigor, and prevent or lessen disagreements or conflicts. Like the DSA, China's recommender law requires more audits and openness for recommendation algorithms. As part of this regulation, China has established an algorithm registry to help learn about algorithms and ensure they operate within reasonable bounds. The security evaluation of registered algorithms is part of the registry. Nevertheless, it is unclear how much helpful information on black box technologies this registry will be able to offer. In the interim, such documentation and comprehension efforts are akin to those of the DSA and other EU laws, such as the EU AI Act.

China recently approved temporary generative AI regulations on May 23, 2023, effective August 15, 2023. The regulations are founded on five central tenets that aim to balance innovation and legal governance. China's essential socialist ideals must be upheld by generative AI, which cannot jeopardize national security or interests, encourage discrimination and other forms of violence, or spread false information (Hine & Floridi, 2024). It is vital to take action to stop discrimination originating from generative AI based on race, religion, country, area, gender, age, employment, and health. Generative artificial intelligence must uphold intellectual property rights and corporate ethics to prevent unethical competition and the disclosure of trade secrets. It is also necessary to take action to increase dependability, accuracy, and transparency. In order to facilitate this, the regulations mandate that generative AI providers perform data processing operations in a manner that maximizes the authenticity, accuracy, objectivity, and diversity of training data while adhering to legal data sources, protecting intellectual property rights, and obtaining consent for the use of personal information.

China's Personal Information Protection Law (PIPL), a government data privacy law aimed at protecting personal information and addressing issues with personal data leakage, has ramifications for automated decision-making technology in addition to these laws that directly target AI. Adopted on August 20, 2021, and coming into effect on November 1, 2021, the PIPL imposes requirements on international firms operating in China and Chinese organizations to safeguard Chinese residents' privacy and personal information (Calzada, 2022). According to the law, any information, whether electronically or otherwise recorded, pertaining to a known or identifiable natural person within the People's Republic of China is considered "personal information" (PI). Similar to the EU's GDPR, PI does not include anonymized data that is non-reversible once anonymized and cannot be used to identify a specific natural person. The following are some of the primary contributions made by the PIPL, together with guidelines about impact assessments and automated decision-making.

More rights are granted to data subjects on how their data is used. They can ask to have their data edited or removed,

have its usage restricted, or have their prior consent revoked. Stricter guidelines for data transmission and sharing, which your company and any joint data controllers from outside parties may need to meet to pass data evaluations. Required security measures must be used when processing and storing the PI, and authorized staff members handling the PI must get training; when the amount of PI is above the threshold established by the Cybersecurity Administration of China (CAC), mandatory data localization is required (Feng, 2019).

The following regulations apply to companies and people who process personal data in China or outside the country, provided the following requirements are met. It provides goods or services to natural persons in China, or personal information is processed. Furthermore, the analysis and evaluation of the behavior of natural persons in China or other situations specified by laws and administrative rules is granted. The processing of personal information by natural persons for domestic or personal purposes is exempt from the law. This covers situations requiring immediate action to safeguard people's lives, health, or property. Aside from these exceptions, personal information handlers who violate the PIPL may be fined up to 50 million RMB, confiscate their money (up to 5% of their yearly revenue), or shut down their firm (Cui & Qi, 2021).

The PIPL is important in regulating AI since it controls data, which is essential to AI. The PIPL operates in China, as recent instances demonstrate how the GDPR applies to AI in the EU. This is seen in China's deepfake regulation, which stipulates that organizations using deepfakes must abide by the country's current PIPL rules. China's Ministry of Science and Technology also released a New Generation Artificial Intelligence Code of Ethics on September 21, 2021, in addition to these rules. The National New Generation Artificial Intelligence Governance Professional Committee released the Ethics Code, which was formed by the Chinese Ministry of Science and Technology to investigate policy recommendations for AI governance. It offers guidance for natural and legal persons and other pertinent institutions and covers the entire life cycle of AI. The following are the primary contributions made by the Specification's general provisions. The first one is the enhancement of human well-being. This implies that AI systems ought to adhere to shared ideals, respect human rights and the core interests of society, foster harmony, enhance livelihoods, and adopt a sustainable strategy for the growth of the economy, society, and environment (Calzada, 2022).

The second is the promotion of justice and fairness. In order to advance equality of opportunity and justice, AI systems should be inclusive, effectively safeguard the rights and interests of those who engage with them, and distribute the advantages of AI throughout society. Respecting vulnerable populations and making accommodations where needed are important. The third is security and privacy protection. AI systems should respect user privacy and make sure that consent is sought before processing personal data. Data

handling should be done safely, and personal privacy should be legally safeguarded. As seen above, the verticals of safety, privacy, and fairness are at the center of the Specification's general provisions. Management standards are urged to concentrate on the proper governance and use of authority in order to minimize AI hazards. The Specification also includes supply specifications that emphasize observing market regulations and making sure emergency plans are in place, as well as R&D specifications on data storage and use that center on security measures and equity.

Additionally, organizational management is encouraged to expand upon the Ethics Code and create policies that align with the requirements of the systems they employ by the organization and implementation rules. The federal government is not the only entity focusing on AI legislation; provincial and local governments are also involved. In contrast to national measures that are more restrictive, regional rules in China have offered a better balance between support for innovation and regulation. Regional laws seem to endorse industry and government best practices for advancing AI development. The province and local AI law in Shanghai and the Shenzhen Special Economic Zone are examined in this section (Dixon, 2023).

The provincial-level Shanghai Regulations, passed in September 2022 and enacted on October 1 of the same year, are intended to foster the growth of the AI industry. Regarding the creative advancement of AI, the rule is seen as industry promotion law. But the law also establishes a graded management system in light of AI's potential future effects. It implements sandbox supervision, which gives businesses a dedicated area to test and investigate new technologies. The Shanghai AI Regulation is unique because it allows for certain leeway for minor violations. This demonstrates a more significant commitment to promoting innovation and aims to continue encouraging the development of AI without burdening businesses or developers with the dread of strict regulation. This is accomplished by including a disclaimer that states that no administrative penalties will be applied for small infractions and that relevant municipal offices will compile a list of infraction behaviors. The rule also creates an Ethics Council to raise ethical awareness and act as a check and balance to the innovation-center strategy (Cheng & Zeng, 2023).

Like the Shanghai Regulations, the Shenzhen AI Regulation was passed in September 2022 and became operative on November 1, 2022, to advance the AI sector. By providing more funding for these initiatives, the rule seeks to incentivize Chinese governmental organizations, more especially those in the Shenzhen Special Economic Zone, to be at the forefront of AI adoption and development. The policy takes a risk-management approach to AI to support this expansion. It does this by permitting Shenzhen-based AI services and products deemed "low-risk" to continue their trials and testing without local regulations as long as international criteria are met. The regulation's Article 72

highlights the value of AI ethics and promotes risk assessments to find unfavorable consequences in systems and goods. The risk classification system will be developed and administered by the Shenzhen government. This is a significant development even though it's a local rule because Shenzhen is home to many AI and tech-related companies. Between 2021 and 2025, USD 108 billion is expected to be invested in this industry.

According to one perspective, China has observed how rules are increasingly being used to establish international norms and standards. In fact, China has been involved in some of the world's earliest enforcement of AI regulation, wanting to set that precedence for itself. However, there is disagreement about whether China's approach to AI regulation is a ploy for political advantage or a sincere attempt to limit the negative effects of AI system research and implementation. However, interpreting China's intentions in the AI regulatory arena in such a binary manner would be incorrect. China's efforts are undoubtedly driven by a desire to establish international norms. However, they also incorporate a multifaceted strategy aimed at regulating the negative effects of AI and comprehending "high-risk" algorithms rather than merely cataloging them. For instance, China is concentrating on the technical ramifications of digital services. In contrast, other regions of the world have prioritized bias and transparency, which is comparable to the goals of the DSA. Making a head start in this regard by trying to delve into the intricacy of black box technology and recommender systems through its algorithmic registry.

It is becoming increasingly apparent that enterprises must be able to keep up with the changing regulatory landscape surrounding them. Given that China is ahead of the curve, it will be intriguing to observe who sets the gold standard for AI in the East, how others may be able to learn from China's example, and how East-West relations on AI continue to converge. Even if the businesses operate outside of China, the country's worldwide influence suggests that the proposed laws might be adopted in other countries and significantly impact the ECOWAS region.

### 3. Methodology

Text analysis is essential in several social scientific fields, including political science, psychology, sociology, and communication studies. The significance and potential of text analysis have increased dramatically in recent years because most human communication is now recorded and processed as digital data due to digitalization. At the same time, text analysis is still a difficult task.

Even though machine learning and natural language processing, two computer techniques for evaluating textual data, have advanced rapidly in recent years, they are still challenging to use and frequently need substantial amounts of manually coded training data and an in-depth understanding of computational techniques. Even then, the approaches frequently only obtain a limited degree of accuracy since they have trouble with irony and sarcasm,

drawing conclusions that call for background knowledge about the world, and important interpretative tasks like placing oneself in the author's shoes. Humans have been regarded as the unmatched gold standard for text analysis. Humans, however, are not without significant restrictions. Manual text reading is time-consuming and expensive, restricting research to small sample sizes, especially for interpretive tasks requiring more in-depth analysis. Because of this, bias, a lack of rigor and repeatability, and poor data quality have all been attributed to manual text analysis (Chang, et al., 2024).

However, the advent of Large-Language Models (LLM) like ChatGPT may change this and the way text analysis is done in the social sciences. Pre-trained on a significant portion of all material on the Internet and in all books ever published, ChatGPT is built on a massive neural network with billions of parameters. These LLMs have proven capable of several unexpected emergent tasks, including programming and translation. Studies have shown that LLMs can perform almost any task we give them regarding text processing (Wang, Qian, Zhou, Chen, & Tan, 2023).

These models can even perform jobs that previous computational methods have failed, such as irony, sarcasm, or subjective and contextual interpretation, because they are general rather than task-specific. According to recent research, LLMs work effectively for many tasks, such as text annotation assignments, ideological scaling, mimicking samples for survey research, and much more. Many academics feel that LLMs constitute a paradigm shift in text analysis in the social sciences because they are simple to use, quick, inexpensive, and relevant to various text analysis tasks. They also disrupt the traditional distinction between the quantitative and qualitative domains by enabling computational analysis of novel challenges (Homoki & Zödi, 2024).

Advanced artificial intelligence (AI) systems called large language models are made to understand and produce human language. These models use enormous volumes of textual data to understand patterns, semantics, and syntax. They do this by utilizing deep learning techniques based on artificial neural networks, essentially abstract mathematical models of brains.

ChatGPT is the most well-known LLM at the moment. An AI chatbot called ChatGPT was created by OpenAI and released in November of 2022. ChatGPT mimics a dialogue with the user. It is built on OpenAI's LLMs GPT-3.5 and GPT-4 and belongs to the Generative Pre-trained Transformer (GPT) family of language models. After being trained on an incredibly large corpus of text, the GPT models were refined to provide replies similar to those of humans by having human trainers serve as both the user and the assistant to the AI solution. Although the smaller transformer-based language models functioned similarly to an advanced autocomplete, the larger models started to exhibit unexpected emergent characteristics and even acquired capabilities for which they had not been

specifically trained. For example, ChatGPT generates fresh sentences and information instead of repeating previously spoken words. In addition, the chatbot may create prose or poetry on any subject in a specific manner, translate between multiple languages, and even generate programming code. One of the most significant emerging capacities for social scientists is the models' ability to interpret almost any textual statement. Almost any query concerning a particular text can be posed to the model by researchers, such as determining themes or topics, if the text contains false information, what emotions are conveyed in the text, or the author's potential objectives. There are yet more tasks that the models are finding excellent at. In interpretive textual analysis, early research has demonstrated that the models can perform better than human experts, demonstrating higher accuracy, reduced bias, and more dependability across languages and regional settings (Mökander, Schuett, Kirk, & Floridi, 2023). The article utilizes a comparative textual analysis approach to analyze AI on the energy regulatory environment in the ECOWAS and how Chinese AI regulations may impact the development of a solid regulatory framework for the region.

#### 4. ECOWAS Energy Regulations

The regional authority for cross-border electrical interconnections in West Africa is the ECOWAS Regional Electrical Regulatory Authority (ERERA). The adoption of an Energy Protocol, which aims to establish the proper institutional and legal framework for the growth of West Africa's electricity industry, is a manifestation of the desire of ECOWAS member states to realize electricity interconnections through the cooperative implementation and sharing of the region's energy resources. In January 2008, the Member States of ECOWAS established the ECOWAS Regional Electricity Regulatory Authority (ERERA) by Supplementary Act A/SA.2/1/08 as a specialized organization of ECOWAS within the framework of the Energy Protocol and the West African Power Pool (WAPP) Program. The overall goal of ERERA is to control cross-border electricity exchanges amongst ECOWAS member states, supervise the establishment of the prerequisites for rationalization and dependability, and assist in creating an economic and regulatory framework conducive to the growth of the regional market (Akinyemi, Efobi, Osabuohien, & Alege, 2019).

According to Article 7 of the Energy Protocol, ERERA's overall mission is to regulate cross-border power pooling among ECOWAS Member States and supervise the implementation of necessary conditions to ensure rationalization and reliability. Additionally, it supports establishing a regulatory and economic environment conducive to the growth of the regional market and supervises compliance with the principle of freedom of electricity transit. Furthermore, it supervises the establishment of a clear, transparent, and predictable tariff-setting methodology for regional power pooling, is in charge of the technical regulation of regional power pooling and the

monitoring of regional market operations, and aids the ECOWAS Commission in defining the strategic direction of the regional market. Furthermore, it shall create efficient channels for resolving disputes amongst participants in the regional power market, oversee its appropriate implementation, and facilitate effective communication amongst the many players in the sector. Finally, the organization develops partnership relations with national regulatory bodies in the Member States and offers them technical advice and help upon request.

In relation to its missions, specific roles include the responsibility of ERERA to manage and regulate the regional electricity market and provide guidance to the ECOWAS commission on all matters concerning the regional market's structure and policies. Another critical focus is overseeing the development of the regulations governing the operation of the regional market and the grant of access to the regional power transmission network, as well as overseeing the implementation and observance of technical guidelines and standards relevant to the regional electricity market. This implies that operators who fail to comply with applicable regulations may face sanctions, and therefore, it makes sure that community directives regarding the regional market's organization are followed (Gatete & Dikko, 2024).

Additionally, there are several requests from national regulatory bodies for permissions or licenses to engage in the regional market that it is required to accept. Another crucial area is overseeing the implementation of the concepts of accounting separation and transparency by power firms in coordination with national regulators. Hence, ERERA is responsible for ensuring that these regulations, guidelines, and principles do not allow for any form of discrimination, cross-industry, or market manipulation, which is an important cornerstone and responsibility in addition to conducting regular operator benchmarking and financial and technical viability assessments (Adigun, 2024).

ERERA plans to develop the regional electricity market by aiding in the efficient development and management of energy resources, demand-side management, economic activity competitiveness, and control over future technological decisions. Furthermore, the organization examines and provides feedback on the Master Plan that WAPP has presented for the creation of regional infrastructure and approves the operators' selection criteria for building the regional power infrastructure so as to prevent anti-competitive practices; consult on any requests for permission to build new lines to the regional transmission network, as specified in the master plan. Finally, it has to make sure the regional network growth strategy is followed and offer solutions if any deviations could have an impact on the local market.

When determining the rates for ancillary services and transmission, ERERA will approve tariff proposals from operators, establish regulations on accounting standards for

tariff structure and cost for transmission and related services, release the relevant tariff rates, and supervise their implementation. Finally, ERERA is responsible for updating the tariff and accounting guidelines to reflect the cost of ancillary services and transmission through open stakeholder consultation. Another crucial aspect is that when resolving disputes, ERERA settles disagreements about how this Regulation or any other Act pertaining to the regional market should be applied or interpreted and creates and disseminates guidelines and processes for resolving conflicts.

Auditing is another crucial task, and in cooperation with national regulators, WAPP, transmission network managers, market operators, and other sub-regional and regional institutions, establish a system for gathering and managing data on power pools, market participants' performance, and other relevant topics. Furthermore, it distributes pertinent information on market operations to the ECOWAS Commission, national regulators, and WAPP while adhering to confidentiality guidelines. Additionally, an annual activity report is submitted to the ECOWAS Commission President. The Regulatory Council is ERERA's management and decision-making body. The Chairperson is one of the three members that make up the Regulatory Council. The members of the Regulatory Council are chosen for a five-year fixed term that is not renewable.

After the second Chairman's term ended in July 2022, a new Chairman took over. His name is Mr. Kocou Laurent Rodrigue TOSSOU, and he works as an engineer. Laurent Tossou has joined the ranks of the two other Regulatory Council members, appointed in May 2017: Mr. Aly Mar NDIAYE, an engineer, and Dr. Haliru DIKKO, an economist. A group of experts in charge of regulatory concerns and a department in charge of administration, finance, and human resources support the Regulatory Council. This organizational structure, created for ERERA's initial three years of operation, is gradually strengthened in accordance with how the activities and the regional market change over time. In order to aid the Regulatory Council in making decisions, consultation institutions may be established as regulatory tools under the ERERA Regulations. Another crucial aspect is the working groups; in order to facilitate the effective gathering of data on the West African power industry, two working groups were established in May 2015: one for data collection and the other for program planning, which aimed to encourage dialogue on the ERERA work programs.

There are several guidelines for Organizing West African Regional Electricity Markets. The primary goal of the Directive, which was adopted in June 2013 by the ECOWAS Council of Ministers, is to establish the general guidelines that would govern the Regional Electricity Market inside the boundaries of the ECOWAS Energy Protocol. Additionally, the Regional Electricity Market Rules (RMR) represent an important component. In accordance with the guidelines and protocols outlined in the "Operation Manual for WAPP

Interconnected Power System," these regulations control the trading of all electricity that travels through the Interconnected Transmission System of the West African Power Pool (WAPP) between participating nations. Finally, the WAPP Operation Manual guarantees, through technical guidelines, that all of the WAPP's interconnected power systems operate the network of interconnected Western African countries effectively and efficiently and that they share equally in the responsibilities and rewards that come with interconnection (Wesseh Jr & Lin, 2016).

Finally, the Transmission Tariff Methodology for WAPP is another critical component. The Regional System and Market Operator (SMO) will use the Transmission Tariff Methodology for the WAPP to create a transparent, understandable, and consistent mechanism for determining transmission pricing. In the context of cross-border power exchange transactions in the regional energy market, it lays down the procedures to be followed as well as the guidelines for transmission pricing.

The West African Power Pool (WAPP) was formed by a group of power firms with the goal of creating a regional electricity market within the ECOWAS area. Creating a Power Sector Regional Regulatory Body (RRB) was a principle taken to ensure harmonization of practices within the regional market and to encourage cross-border power exchanges between Member States. Without assessing current regional regulation models in the energy sector generally and the power sector specifically, its design would not have been possible. The analysis of regional regulation practices across the globe reveals two distinct categories of organizations: those established at the governmental or intergovernmental levels, possessing genuine authority over the regulated areas with respect to decision-making, oversight, and control, and those originating from associations of national regulators, typically limited to consultative authority (Ogwezy, 2017).

In order to ascertain how different stakeholders interact and their effect on the power sector's functioning, it is necessary to analyze the institutional structure of the area in question before establishing a regulatory body at the regional level. In order to do this, it is necessary to look at the background and surroundings of each regulatory model, highlighting the roles and responsibilities of the regulator and, if needed, examining how it interacts with other regional organizations whose operations affect cross-border power exchanges as well as national regulators. The analysis makes the identification of models that will serve as models for the development of regulations for the establishment and functioning of the Regional Regulatory Body in the ECOWAS power sector possible.

## 5. Legal Analysis of AI's impact on the ECOWAS

The nature of AI R&D poses additional challenges to the effective regulation of AI. AI R&D is similar to other technologies of the Information Age in that it is diffuse, opaque, discrete, and discreet. That is to say, AI

development frequently takes place in private or isolated environments, making oversight and regulation challenging. The attribution of responsibility is complicated by the fact that AI systems are constructed from various components, most of which are obtained from separate sources. Moreover, centralized control is challenging due to the broad nature of AI development and the fact that it can be conducted by a variety of actors, including small teams or lone individuals. Lastly, effective monitoring is hampered by the fact that the inner workings of AI systems are frequently opaque, either as a result of the technology's complexity or developers' deliberate secrecy (Ahmad, et al., 2021).

There is a great deal of hope that legal frameworks might reduce the associated public risks of artificial intelligence (AI) without inhibiting innovation, even in spite of the technology's complexity and possible hazards. A comprehensive strategy that strikes a balance between legislation and technical advancement is needed to address the legal voids surrounding AI. The first issue is how inadequate the current legal system is to address AI. The legal system must change to accommodate AI's special needs. This involves the challenging but not unique task of developing legal terminology for artificial intelligence. The legal system is known for its history of clarifying vague concepts and making necessary adjustments. Likewise, courts have long accommodated technological advancements, and they are not unfamiliar with the concepts of foreseeability and causality in deciding culpability.

An additional problem to the one above is the management of AI systems to avert harm after development. However, This does not negate the need to regulate AI development before implementation. Current legal systems can address the discrete and opaque nature of AI. For example, a lot of technologies combine parts from several sources, and courts have long handled culpability in these situations. Legal measures, such as incentives or regulation, might require transparency in AI systems, requiring businesses to reveal the inner workings of their systems. AI is not the only sophisticated system. Even though components of other contemporary technologies come from different sources, the legal system has evolved to deal with these complications. For instance, the car industry has guidelines for allocating responsibility in cases where many components cause a failure. The opacity of AI can also be decreased by enacting legislation mandating the release of AI specifications and code, as well as by offering tax breaks and tort rules that support open systems. It's also important to remember that big, obvious companies developing AI give regulations a tactical edge. Even if AI has the potential to spread widely, large companies with substantial financial and human resources are expected to make significant advancements. Businesses like Google, IBM, Facebook, Microsoft, and Facebook have already made significant investments in AI initiatives, indicating that businesses and governments will drive most of AI development. The concentration facilitates regulators and judges' oversight and management of the

public hazards associated with AI. Globally, the application of artificial intelligence (AI) in the energy industry is fast developing, and various nations and areas are now putting rules and laws in place to deal with its effects. Globally, policymakers are realizing more and more how crucial it is to regulate AI to guarantee that it is applied morally and responsibly. Nations, including Brazil, Israel, Italy, Japan, and the United Arab Emirates, are proactively molding their AI policies to mitigate any possible adverse outcomes.

Europe recently took a big step forward by enacting extensive AI laws. These rules are intended to address a number of topics, including high-risk systems, public spaces' use of AI, and openness in AI systems. Model review, risk mitigation, and incident reporting will all be more stringent for highly impactful models that represent systemic hazards (Tallberg, Lundgren, & Geith, 2024).

China has published a draft set of generative AI regulations and is looking for public input on the draft regulations. China, in contrast to most other nations, has legislation requiring generative AI to adhere to "Socialist Core Values." According to the draft laws, training data sources are restricted because developers may be held accountable if their data violates third parties' intellectual property. Additionally, developers may be held accountable for the results produced by their AI. Legislation requires AI services to generate only "true and accurate" material. China is ahead of other countries that are only now beginning to create new laws because these proposed regulations are an extension of current laws pertaining to deepfakes, recommendation algorithms, and data security. Israel's Ministry of Innovation, Science, and Technology released a draft policy on artificial intelligence regulation in 2022. The draft policy aims to give businesses, organizations, and governmental entities involved in artificial intelligence a moral and practical direction. The policy underlines the value of responsible innovation and stresses that privacy, human dignity, public interests, fundamental rights, and the rule of law must all be respected in the development and application of AI. While artificial intelligence (AI) is transforming several industries, including healthcare and banking, there are also serious hazards for the general population. It is increasingly important to make sure AI systems are safe and consistent with human values as they get more intelligent and independent. It is possible to develop a thorough regulatory structure in order to handle these difficulties. By creating an organization tasked with verifying the security of AI systems, this approach can control the dangers associated with AI while encouraging innovation (Sheehan, 2023).

This legislative framework suggests creating a dedicated organization to attest to the security of AI systems. This approach presents a nuanced liability mechanism, in contrast to typical regulatory organizations that might outright ban harmful products. This system separates AI that is certified from uncertified. AI system designers, producers, and vendors who obtain agency certification will be subject to

limited tort responsibility. Companies are encouraged to make sure their AI systems adhere to safety regulations by this restricted responsibility. Businesses that provide uncertified AI for use in commerce risk severe joint and several liability. This incentivizes them to pursue certification since it implies they will be held entirely responsible for any damage done by their AI systems.

This framework makes use of many institutions' advantages. With their democratic legitimacy, legislators will establish the general objectives and aims of AI legislation. The scientific evaluation of AI safety will be handled by an impartial organization that employs experts, keeping these choices separate from electoral politics. Courts will use their experience managing specific cases to resolve disputes and assign blame for problems associated with AI (Stuurman & Lachaud, 2022).

A crucial component in guaranteeing responsibility and equity in the artificial intelligence (AI) regulatory framework that is being suggested is the court's participation. Courts are given the authority to decide specific tort claims resulting from harm caused by AI systems under this paradigm. In order to establish culpability and administer justice, courts will traverse difficult legal terrain by drawing on their institutional strength and fact-finding competence. In addition, courts will be essential in dividing up the responsibilities of the different parties engaged in the creation, deployment, and use of AI systems. Courts will apply strict liability rules in situations where uncertified AI is involved, holding all parties involved in the development and implementation of the AI system liable. By ensuring that everyone shares the proper burden for harm caused by AI, this responsibility-sharing promotes an accountable culture within the AI sector. With the fast-changing and dynamic nature of technology, disputes are unavoidable, and the legal system is prepared to handle these issues. Specifically, disagreements could emerge regarding AI systems' certification status or the point at which changes made the system uncertified. The court's involvement becomes even more crucial in this situation since it has to sort through intricate legalese and technical issues to render equitable and fair rulings.

Pre-trial proceedings will be held to ascertain whether the AI system complies with certified versions, to set the liability threshold, and to draw a boundary between defendants who are subject to strict liability and those who are subject to limited liability. By guaranteeing that justice is done and legal norms are respected, the court essentially acts as a pillar of the regulatory framework for artificial intelligence.

## 6. Conclusion

AI's introduction into the energy sector offers hitherto unseen opportunities as well as difficult regulatory obstacles. AI revolutionizes oil drilling and improves smart grids but raises concerns about liability and accountability.

Because the current legal system finds it difficult to manage AI's autonomy and clandestine development, regulating AI in the energy sector demands striking a careful balance between supporting innovation and managing dangers. This calls for a comprehensive regulatory approach. Working together to integrate legal, technological, and ethical considerations is crucial as we head toward an AI-driven future. By adopting this strategy, we can mitigate risks and guarantee a just and sustainable energy future while utilizing AI's disruptive potential in the energy sector.

AI may play a significant role in enhancing renewable energy production, supporting localization, and establishing microgrids. This requires understanding the many stakeholders engaged in developing the power sector. This includes investors, financial institutions, local citizens, and entrepreneurs who may encourage the development of new business models and power solutions. This has been indicated by the ECOWAS regional strategy and action plans as a crucial component. Regional capacity-building workshops have aimed to enhance member states' comprehension of green power production and technologies, industrial challenges, and opportunities for key stakeholders in the sub-regions energy sector. AI may enhance faster adoption and more excellent power stability.

## References

- Adigun, M. (2024). Legal remedies for energy injustice in the ECOWAS sub-region: the role of the ECOWAS Court. *Journal of Energy & Natural Resources Law*, 1-18.
- Ahmad, T., Zhang, D., Huang, C., Zhang, H., Dai, N., Song, Y., & Chen, H. (2021). Artificial intelligence in sustainable energy industry: Status Quo, challenges and opportunities. *Journal of Cleaner Production*, 289, 125834.
- Akinyemi, O., Efobi, U., Osabuohien, E., & Alege, P. (2019). Regional integration and energy sustainability in Africa: Exploring the challenges and prospects for ECOWAS. *African Development Review*, 31(4), 517-528.
- Baş, B., & Demirtaş, I. (2022). A View of Energy Cooperatives from the Framework of Energy Justice. *Journal of Recycling Economy & Sustainability Policy*, 1(1), 18-26.
- Calzada, I. (2022). Citizens' data privacy in china: The state of the art of the personal information protection law (PIPL). *Smart Cities*, 5(3), 1129-1150.
- Chang, Y., Wang, X., Wang, J., Wu, Y., Yang, L., Zhu, K., & Xie, X. (2024). A survey on evaluation of large language models. *ACM Transactions on Intelligent Systems and Technology*, 15(3), 1-45.
- Cheng, J., & Zeng, J. (2023). Shaping AI's future? China in global AI governance. *Journal of Contemporary China*, 32(143), 794-810.

- Clarke, R. (2019). Regulatory alternatives for AI. *Computer Law & Security Review*, 35(4), 398-409.
- Cui, S., & Qi, P. (2021). The legal construction of personal information protection and privacy under the Chinese Civil Code. *Computer Law & Security Review*, 41, 105560.
- Dhabliya, D. (2024). Smart Grids Optimization for Energy Trading with AI Solutions. *Acta Energetica*, 2, 71-81.
- Dixon, R. B. (2023). A principled governance for emerging AI regimes: lessons from China, the European Union, and the United States. *AI and Ethics*, 3(3), 793-810.
- Fan, S., Ai, Q., & Piao, L. (2018). Bargaining-based cooperative energy trading for distribution company and demand response. *Applied energy*, 226, 469-482.
- Feng, Y. (2019). The future of China's personal data protection law: challenges and prospects. *Asia Pacific Law Review*, 27(1), 62-82.
- Gatete, C., & Dikko, H. (2024). Policy Framework and Regulations to Promote Clean Energy and Renewable Energy Transition in ECOWAS Countries. *Energy Regulation in Africa: Dynamics, Challenges, and Opportunities*, 131-150.
- Hine, E., & Floridi, L. (2024). Artificial intelligence with American values and Chinese characteristics: a comparative analysis of American and Chinese governmental AI policies. *AI & SOCIETY*, 39(1), 257-278.
- Homoki, P., & Zódi, Z. (2024). Large language models and their possible uses in law. *Hungarian Journal of Legal Studies*.
- Kökuti, T. (2023). Artificial Intelligence in a Transforming Labour Market – New Skills are Needed? *Journal of Recycling Economy & Sustainability Policy*, 2(1), 21-27.
- Mökander, J., Schuett, J., Kirk, H. R., & Floridi, L. (2023). Auditing large language models: a three-layered approach. *AI and Ethics*, 1-31.
- Niet, I. (2022). Between vision and practice: lack of alignment between AI strategies and energy regulations in the Dutch electricity sector. *Discover Artificial Intelligence*, 2(1), 24.
- Ogwezzy, M. (2017). An Appraisal of ECOWAS Regional Energy Investment Initiatives. *Nigerian Law Journal*, 20, 486.
- Pan, X., Ai, B., Li, C., Pan, X., & Yan, Y. (2019). Dynamic relationship among environmental regulation, technological innovation and energy efficiency based on large scale provincial panel data in China. *Technological Forecasting and Social Change*, 144, 428-435.
- Roberts, H., Cows, J., Morley, J., Taddeo, M., Wang, V., & Floridi, L. (2021). The Chinese approach to artificial intelligence: an analysis of policy, ethics, and regulation. Springer International Publishing.
- Sheehan, M. (2023). China's AI regulations and how they get made. *Horizons: Journal of International Relations and Sustainable Development*, 24, 108-125.
- Shimizu, H., & Nakayama, K. (2020). Artificial intelligence in oncology. *Cancer science*, 111(5), 1452-1460.
- Smuha, N. A. (2021). From a 'race to AI' to a 'race to AI regulation': regulatory competition for artificial intelligence. *Law, Innovation and Technology*, 57-84.
- Stuurman, K., & Lachaud, E. (2022). Regulating AI - A label to complete the proposed Act on Artificial Intelligence. *Computer Law & Security Review*, 44, 105657.
- Tallberg, J., Lundgren, M., & Geith, J. (2024). AI regulation in the European Union: examining non-state actor preferences. *Business and Politics*, 26(2), 218-239.
- Veale, M., & Zuiderveen Borgesius, F. (2021). Demystifying the Draft EU Artificial Intelligence Act—Analysing the good, the bad, and the unclear elements of the proposed approach. *Computer Law Review International*, 22(4), 97-112.
- Wang, Y., Qian, W., Zhou, H., Chen, J., & Tan, K. (2023). Exploring new frontiers of deep learning in legal practice: A case study of large language models. *International Journal of Computer Science and Information Technology*, 1(1), 131-138.
- Wesseh Jr, P. K., & Lin, B. (2016). Output and substitution elasticities of energy and implications for renewable energy expansion in the ECOWAS region. *Energy Policy*, 89, 125-137.