CASE STUDY

The African Development Bank Database Management System (DBMS) for Energy Regulators



This case study draws on conversations with and articles submitted by Solomon Sarpong, Energy Economist at the Energy Financial Solutions, Policy and Regulation Department of the African Development Bank Group's Power, Energy, Climate Change and Green Growth Complex, based at the Nigeria Country Office, and Guillaine Neza, Senior Energy Specialist (Policy) at the African Development Bank Group. Additional insights were gathered through interviews with Ernie Ofori, Independent Consultant; Steven Magezi and Aminah Namuddu of Uganda's Electricity Regulatory Authority (ERA); Khamis Khamis of the Zanzibar Utilities Regulatory Authority (ZURA); Mtumwa Simba of Tanzania's Energy and Water Utilities Regulatory Authority (EWURA); Alhadji Jabaru, Director for Regional Coordination at Ghana's Public Utilities Regulatory Commission (PURC); and Abdullahi Adamu, Director, Research and Data Analytics Division, Nigerian Electricity Regulatory Commission (NERC). The author gratefully acknowledges their invaluable contributions and thanks them for sharing their time, expertise and practical insights into the design, implementation and use of regulatory database management systems across different national and institutional contexts.

EXECUTIVE SUMMARY

Africa's power sector and essential public utilities, particularly electricity and water services, play a key role in supporting economic development and improving the living standards of the continent's population. However, energy regulators across Africa often operate with, among other, fragmented information systems, inconsistent reporting practices and limited mechanisms for exchanging information with regulated entities and other stakeholders. To address these challenges, the African Development Bank (AfDB), through the Africa Energy Sector Technical Assistance Program (AESTAP), manages a technical assistance programme to establish and operationalize a Database Management System (DBMS) for Energy Regulators. The systems are intended to replace fragmented and manual processes with structured digital workflows covering functions such as regulatory reporting, utility-performance monitoring, complaints management, licensing, tariff submissions, internal approvals and access to regulatory information. Although common functional requirements are used, each system is adapted to the beneficiary regulator's mandate, procedures, technological capacity and national circumstances. The Bank's DBMS projects follow an established process comprising an independent needs assessment and business case, beneficiary validation of technical specifications, and vendor procurement for system development and deployment. Each system is tailored to the regulator's operational needs within an agreed scope and budget (Sarpong, 2026).

Launched in 2019, the AfDB DBMS for Energy Regulators was first implemented at Ghana's Public Utilities Regulatory Commission, where it digitalised processes such as data collection, tariff submissions and complaints management. A second phase is ongoing to complete the digitalisation cycle by integrating utilities' platforms with the regulator's system, enabling direct data exchange. In Nigeria, AfDB support enabled the Nigerian Electricity Regulatory Commission (NERC) to establish a Data Management Portal that centralises licensees' regulatory submissions, replacing separate information requests from individual divisions. According to Abdullahi Adamu, Director of Research and Data Analytics at NERC, automated notifications and reminders have improved reporting timeliness, while centralised data verification and access have supported faster preparation of regulatory publications and more efficient responses to internal data requests.

Similar interventions are underway in Guinea, the Central African Republic, Tanzania and Uganda, as well as with regional bodies such as the Common Market for Eastern and Southern Africa (COMESA), the Economic Community of West African States (ECOWAS), the Southern African Development Community (SADC) and the Economic Community of Central African States (ECCAS). Ghana's experience also shows that successful digitalisation depends on organisational change. The initial development and consultation process took approximately eight months to one year, with stakeholder acceptance and staff adoption among the principal challenges. Ghana's Public Utilities Regulatory Commission (PURC) responded through training, technical support, standard operating procedures, supervision and the designation of internal DBMS champions. Staff continuity helped preserve institutional knowledge as the system progressed from its first phase towards greater integration with utilities and other sector institutions. This experience confirms that a regulatory DBMS becomes sustainable when it is incorporated into daily work and supported by internal technical capacity, management ownership, reliable infrastructure, data backup and adequate maintenance arrangements.

The experiences of Uganda, mainland Tanzania and Zanzibar illustrate different implementation challenges. At the time of the interviews, their systems had not been fully deployed, and the expected benefits cannot yet be treated as verified outcomes. Uganda's Electricity Regulatory Authority (ERA) was preparing for user-acceptance testing after approximately three years of development. ERA currently relies heavily on quarterly reports from licensees and receives a comparatively small number of consumer complaints. Its proposed system is expected to support public outage reporting, analytics, site audits and more timely monitoring of electricity reliability. Its effectiveness will also depend on improving public awareness and participation so that the information collected reflects consumers' experiences. In mainland Tanzania, the Energy and Water Utilities Regulatory Authority (EWURA) continued to process several performance indicators through spreadsheets and email. Its experience demonstrates the difficulty of integrating information originating from systems with different levels of digital maturity. It also shows the risks of placing several independent regulators under a common implementation timetable, as differences in institutional readiness can delay the entire project. In Zanzibar, the Utilities Regulatory Authority (ZURA) was still completing technical configuration and data preparation and had not yet engaged its principal utility or consumers. This highlights the importance of involving utilities, users and other stakeholders early enough to validate workflows and requirements before substantial system configuration has been completed.

The country experiences highlight the importance of institutional ownership and effective management of changes to the agreed scope. According to the Bank, Liberia's system was delivered functional, with training and continued technical support, but insufficient staffing and operational resources committed by LERC have constrained adoption. In Uganda and Tanzania, expanding requirements have contributed to implementation delays. Additional requests require separate scope and financing arrangements, while beneficiaries must commit resources to operate and sustain the systems (Sarpong, 2026). The AfDB-supported training covered both technical skills and change management, recognising the need to prepare staff for new working practices alongside the use of the software. Continued training, user-acceptance testing, stakeholder engagement and institutional ownership remain essential to embedding the systems into daily regulatory operations.

The planned *Strengthening the Institutional Capacity for the Central African Republic Electricity Regulator* project reinforces these lessons through its proposed combination of institutional and technological assessments, defined business requirements, a tailored Management Information

System, stakeholder consultation, user testing, capacity building and sustainability arrangements. At the regional level, compatible national platforms and harmonised reporting practices can improve regulatory cooperation and information exchange among national regulators, regional institutions and power pools. A DBMS cannot create an integrated electricity market on its own, but it can provide part of the institutional and informational foundation required for cross-border electricity trade and the progressive development of the African Single Electricity Market.

The information accumulated through regulatory platforms could eventually support carefully targeted applications of artificial intelligence (AI). As part of the second phase of Ghana's DBMS implementation, AI-supported analysis is being considered to identify recurring complaint patterns and examine consumer cases alongside utility performance data. Uganda could apply it to outage reporting and reliability monitoring once participation and data volumes improve. Mainland Tanzania must first structure and integrate its regulatory information, while Zanzibar should prioritise system completion, stakeholder engagement and data generation. Across all countries, AI should support rather than replace regulatory judgement and should be introduced with appropriate safeguards for data quality, privacy, cybersecurity, transparency and human oversight.

The AfDB DBMS for Energy Regulators is more than an information-technology investment; it is an institutional-strengthening instrument that can improve the availability and use of regulatory information, reinforce oversight and support more transparent and responsive services. The country evidence confirms that replication should be phased, institution-led and adapted to national circumstances. Strong ownership, realistic implementation arrangements, stakeholder participation, sustainable technical capacity and measurable performance indicators will be essential if the programme is to provide a scalable foundation for more efficient, accountable and data-driven electricity regulation across Africa.

1. Context

1.1. Overview of the Power and Energy Sector in Africa

Africa's power sector plays a central role in the continent's economic transformation, industrial development and delivery of essential public services. Reliable and affordable electricity is necessary for productive economic activity, healthcare, education, communications, water services and improvements in living standards. However, the sector continues to face major challenges relating to electricity access, reliability, affordability, infrastructure financing and the operational performance of utilities. According to the International Energy Agency (IEA), approximately 600 million people in Africa remain without access to electricity, with most of the access deficit concentrated in sub-Saharan Africa[1]. At the same time, Africa's power sector is undergoing significant transformation. Electricity demand is increasing as a result of population growth, urbanisation, industrialisation and the expansion of digital services. Countries are also diversifying their electricity-generation mix, developing renewable-energy resources, expanding national and regional power networks, and introducing decentralised solutions such as mini-grids and stand-alone solar systems. These developments are increasing the number and diversity of participants operating within national electricity markets.

[1] International Energy Agency (IEA), *Financing Electricity Access in Africa*, Paris, 2025, available at https://www.iea.org/reports/financing-electricity-access-in-africa

Mobilising the investment required to expand generation capacity, strengthen transmission and distribution networks, and improve electricity access will depend on credible institutions and predictable regulatory frameworks. The International Energy Agency estimates that achieving universal electricity access in sub-Saharan Africa by 2035 would require approximately USD 15 billion in annual investment[2]. Strong regulation is therefore essential for maintaining an appropriate balance between the financial sustainability of utilities, the affordability and quality of services provided to consumers, and the establishment of an enabling environment for public and private investment.

1.2. The Challenges Faced by National Energy Regulators

The role of regulators is evolving as power markets become more complex. The African Development Bank's Electricity Regulatory Index (ERI), introduced in 2018, illustrates the growing importance of effective regulation, and assesses the development of electricity-sector regulatory frameworks against international standards and good practices. By 2024, the index covered 43 African countries with established regulators, and it has helped identify institutional and operational weaknesses, including challenges related to information exchange, reporting, transparency and the availability of reliable data for regulatory decision-making.

A major challenge facing national energy regulators is collecting reliable information in a consistent format that can be easily shared and analyzed. Many regulators continue to rely on manual procedures, paper-based documentation, spreadsheets and separate information systems that are not connected to one another.

Information may be submitted by regulated entities through different formats and communication channels, making it difficult to verify, consolidate and analyse. In Ghana, the Public Utilities Regulatory Commission (PURC) had decentralised consumer services across regional offices, yet paper files made it difficult for headquarters to track complaints, review case histories and supervise work at a distance. In Liberia, the Regulatory Database Management System (RDBMS) was designed to improve how the Liberia Electricity Regulatory Commission (LERC) collects, analyses and shares regulatory information (Teh, 2024). In Nigeria, the Nigerian Electricity Regulatory Commission (NERC) faced fragmented information requests from individual divisions and the challenge of managing reporting obligations across multiple licensees with different monthly, quarterly and annual submission requirements. In Uganda, the Electricity Regulatory Authority (ERA) explained that its oversight of electricity reliability depends heavily on quarterly reports from licensees and on complaints from consumers, many of whom may not know how to reach the regulator. At Tanzania's Energy and Water Utilities Regulatory Authority (EWURA), electricity-sector performance data have largely been exchanged through spreadsheets and email, making consolidation and analysis laborious. For Zanzibar's Utilities Regulatory Authority (ZURA), the immediate task is to establish digital channels for outage reports, consumer complaints, licensing and utility performance data before the system is opened to stakeholders. These experiences show why the AfDB-supported DBMS initiative must be assessed within each national regulatory context. The key question is whether it gives staff better visibility of operational problems, supports faster and better-informed decisions, and ultimately improves services for consumers.

1.3. The African Development Bank Database Management System for Energy Regulators

[2] International Energy Agency (IEA), *Financing Electricity Access in Africa*, Paris, 2025, available at https://www.iea.org/reports/financing-electricity-access-in-africa

The AfDB DBMS for Energy Regulators is designed to support regulatory authorities in migrating from fragmented and manual procedures to automated and harmonised systems. National energy regulators are its principal beneficiaries, although the system also facilitates interaction with regulated utilities, consumers, civil-society organisations, government institutions and investors. Rather than deploying an identical platform in every country, the initiative uses common functional requirements while allowing each regulator to adapt the system to its procedures and priorities. Nigeria illustrates how the system can reflect a regulator's operational procedures and priorities, as the NERC's Data Management Portal accommodates different reporting schedules and centralises information requests through its Data Management Unit, replacing separate requests from individual divisions. In addition, automated notifications help track submission deadlines, while the unit verifies incoming data before making it available to internal users (Adamu, 2026). In Ghana, the Public Utilities Regulatory Commission (PURC) uses its system to register and track consumer complaints, share documents across regional offices and give managers access to case records and reports. In Liberia, the planned scope included complaints management, licensee registration, performance monitoring, digital inspections and executive dashboards. In Uganda, the system under development focuses on public reporting of low-voltage outages and the analysis of data. The planned functions in mainland Tanzania and Zanzibar include electronic utility reporting, complaints management and licensing.

The AfDB DBMS for Energy Regulators involves work beyond software installation: regulators define their requirements, review existing procedures, train staff and prepare to exchange information with utilities and other stakeholders. Ghana's experience shows how a shared system can give managers better access to case records and reports across regional offices. In Liberia, LERC cited limited staffing capacity as a barrier to adopting the system after handover, highlighting the importance of assigning staff to operate and maintain it (Sarpong, 2026b).

1.4. The Growing Importance of Digital Transformation in Energy Regulation

Digital transformation requires institutions to redesign processes, harmonise reporting requirements and use technology to improve the way information is collected, analysed, exchanged and communicated. For energy regulators, digitalisation provides an opportunity to replace isolated administrative procedures with integrated and transparent regulatory workflows. Digital platforms can simplify the submission of information by utilities, reduce repetitive manual processing and enable regulators to monitor the progress of complaints, applications and approvals. They can also strengthen internal accountability by recording when information was submitted, who reviewed it, what action was taken and when a decision was completed. Digitalisation also strengthens transparency and stakeholder participation, as consumers can submit complaints electronically and monitor their resolution, while civil-society organisations and the public can obtain easier access to regulatory information. Regulators can communicate decisions, performance indicators and service-quality information more efficiently. Finally, improved access to accurate and timely information also reduces uncertainty for investors and contributes to a more predictable regulatory environment.

The AfDB DBMS for Energy Regulators reflects this broader transformation. Beginning with Ghana's Public Utilities Regulatory Commission (PURC) in 2019, the initiative has supported the digitalisation of regulatory processes and has subsequently expanded to other national and regional regulatory institutions. The programme demonstrates how technology, when combined with institutional capacity building, cybersecurity measures, system maintenance and regulatory ownership, can strengthen the effectiveness and sustainability of energy regulation.

1.5. Objectives and Scope of the Case Study

This case study examines how the African Development Bank supports national energy regulators in addressing operational challenges through the DBMS for Energy Regulators, and what can be learned from its implementation in Ghana, Liberia, Nigeria, Uganda, mainland Tanzania and Zanzibar. It examines the regulatory processes each institution has prioritised and the changes reported by staff who use the systems. It distinguishes the Liberia, Nigeria and Ghana's operational experience from the expected benefits described by regulators whose systems had not yet gone live at the time of interview. Where records are available, the study seeks to assess results against measurable indicators, such as complaint-handling times, reporting delays and the completeness of regulatory data.

Drawing on discussions with stakeholders from the national regulators, AfDB staff and a consultant involved in the system design, the study also examines why progress has differed across institutions. It considers procurement and approval delays, staff training and adoption, engagement with utilities and consumers, integration with existing systems, and the capacity to maintain and protect regulatory data. The lessons are intended to inform future support to national regulators and wider regional cooperation.

2. The African Development Bank DBMS for Energy Regulators

2.1. Overview, Rationale and Strategic Objectives

The African Development Bank initiated its support for the digitalization of regulatory processes in 2019 through the establishment of a DBMS for Ghana's Public Utilities Regulatory Commission (PURC). The system became operational in June 2021 and subsequently provided a model for similar initiatives across Africa. The initiative emerged from the Bank's broader work on electricity-sector regulation, particularly the findings of the Electricity Regulatory Index (ERI) for Africa. This work identified access to reliable information, information exchange and transparency as recurring constraints affecting regulatory performance. Energy regulators collect and process large volumes of technical, financial, commercial and consumer-related information. This information is required for tariff reviews, licensing, monitoring utility performance, assessing service quality, managing consumer complaints and ensuring compliance with regulatory requirements. However, many regulators continue to depend on manual procedures, paper-based records, spreadsheets and disconnected information systems. Regulated entities may also submit information through different channels and reporting formats, making consolidation, verification and analysis more difficult.



Representatives of the PURC, African Development Bank and electricity-sector stakeholders at the launch of DBMS Phase II in Accra, December 2023.
Source: Energy News Africa[3].

The AfDB DBMS for Energy Regulators was developed to address these institutional and operational constraints. Its principal beneficiaries are national and regional energy regulatory authorities. The platform supports their transition from fragmented and manual processes to more automated, integrated and harmonised regulatory systems. The strategic objectives of the initiative are to:

- digitalise and automate regulatory processes;
- harmonise the collection and reporting of regulatory information;
- improve the accuracy, consistency and traceability of data;
- simplify reporting, complaints management and approval processes;
- facilitate information exchange between regulators and regulated entities;
- strengthen transparency and accountability in regulatory processes and decision-making;
- improve public access to regulatory information;
- strengthen the institutional and technical capacity of energy regulators; and
- contribute to a more predictable and enabling regulatory environment for investors.

According to Solomon Sarpong, Economist at the African Development Bank, the initiative is intended to facilitate information exchange among regulators, regulated entities, consumers, civil-society organisations and investors. Guillaine Neza, also an Economist at the Bank, emphasised that technology should be viewed as a practical tool for simplifying the work of energy regulators, increasing reporting accuracy and improving the transparency of regulatory processes.

[3] https://energynewsafrica.com/ghana-afdb-provides-us590k-funding-support-to-purc-to-implement-phase-ii-of-database-management-system-project/

2.2. Key Components of the AfDB DBMS Platform

The AfDB DBMS for Energy Regulators is a configurable digital platform rather than a single standardised application deployed in exactly the same manner in every country. Its functions are adapted to the mandate, processes, reporting requirements and existing information systems of each beneficiary institution. The platform combines database-management software, digital interfaces, analytical tools, hosting infrastructure and user applications. Its principal components and functions include:

- **Regulatory data collection and reporting**: Regulated entities can submit technical, financial, commercial and operational information directly through the platform using standardised reporting formats. This reduces reliance on emails, paper documentation and separate spreadsheets while improving the consistency and comparability of information.
- **Data management, analysis and visualisation**: The system stores regulatory information in a structured environment and enables regulators to analyse data, monitor performance indicators and generate reports, dashboards and infographics. These functions support timely and evidence-based regulatory decisions.
- **Complaints management**: Consumers can submit complaints electronically and receive a reference or ticket number through which the progress of the complaint can be monitored. Regulators can identify the institution or officer responsible for each stage of the process, monitor response times and determine whether the regulated utility has taken the required action.
- **Geolocation of incidents and complaints**: Where geotagging is integrated into the platform, regulators can identify geographical concentrations of similar complaints or service interruptions. Repeated complaints from a particular area may, for example, indicate an overloaded transformer, a defective feeder or another localised service problem requiring investigation by the utility.
- **Tariff and regulatory submissions**: Utilities can submit tariff-related information directly through the system. The platform records the submission, review and approval process, enabling senior management to monitor progress and improving the traceability of regulatory decisions.
- **Licensing and approval processes**: Digital workflows can be used to receive applications, verify documentation, assign reviews and monitor the progress of licensing, certification and other regulatory approvals. This reduces processing delays and provides a clearer record of the actions taken at each stage.
- **Field-data collection**: Regulatory staff can use tablets or other digital devices to collect information during inspections and surveys. Data can be transmitted directly to the central system, reducing the need for subsequent manual entry and facilitating faster analysis.
- **Information access and stakeholder engagement**: The platform can provide regulated entities, consumers, civil-society organisations and other stakeholders with access to relevant regulatory information. This supports greater understanding of regulatory decisions and enables more informed participation in processes such as tariff reviews.
- **System administration, security and recovery**: The platform incorporates user-access controls, data-protection arrangements, backup functions and system-recovery

mechanisms. These components are important because the information managed by regulators may include sensitive commercial, financial and consumer data.

In practice, the AfDB-supported systems respond to different regulatory needs across countries. At Ghana's PURC, the operational system records consumer complaints, assigns case references and gives authorised staff access to case histories and documents across regional offices. Alhadji Jabaru, PURC's Director for Regional Coordination, explained that a case escalated to headquarters can now be retrieved using its reference number, without assembling and sending a physical file to Accra. Managers can also review regional reports directly in the system.

Uganda's Electricity Regulatory Authority (ERA) is developing public outage reporting and analytical tools to improve its view of low-voltage electricity reliability. Mainland Tanzania's Energy and Water Utilities Regulatory Authority (EWURA) plans to receive electricity-sector performance data electronically, alongside complaints and licensing functions. The Zanzibar Utilities Regulatory Authority (ZURA) has identified outage reporting, complaints intake, licensing and utility performance reporting as priorities. At the time of the interviews, these three systems had not yet been fully launched. The functions described therefore represent their intended uses rather than verified operational results.

2.3. Implementation Approach and Participating Regulatory Authorities

Implementation of the AfDB DBMS follows a progressive and institution-focused approach. The system is configured according to the beneficiary regulator's responsibilities, existing procedures, information requirements and technological capacity. Implementation generally combines process digitalisation, software development or configuration, provision of the required infrastructure, data-management arrangements, staff training and technical assistance. The first implementation began in 2019 at Ghana's Public Utilities Regulatory Commission, with support from the Korea-Africa Economic Cooperation Trust Fund (KOAFEC). The initial phase, completed in 2021, digitalised a wide range of internal and external regulatory processes. It covered complaints management, tariff submissions, internal workflows, field surveys, data analysis and stakeholder access to information. Implementation has followed different institutional and procurement approaches across countries. According to Ernie Ofori, Ghana's acquisition was led locally, whereas the Bank led the acquisition process for Uganda. The resulting systems are adapted to each national context; for example, Ghana and Liberia use different software products. Ofori explained that common functional specifications and provisions for future system integration are intended to support information exchange despite those differences. Ghana is the most mature case covered by the stakeholder interviews. Jabaru estimated that its initial discussions, system development and stakeholder engagement took approximately eight months to one year before launch; PURC is now working on a second phase intended to strengthen exchanges with utilities and other sector institutions. According to Solomon Sarpong, the Korea–Africa Economic Cooperation (KOAFEC) programme is also funding the DBMS project in Uganda and Tanzania (Sarpong, 2026). In Liberia, the Liberia Electricity Regulatory Commission (LERC) launched its Regulatory Database Management System (RDBMS) in March 2024 with support from the African Development Bank. The system was intended to improve the collection, analysis and sharing of regulatory information and support functions such as quality-of-service monitoring and consumer complaints handling (Teh, 2024). The rollout followed the Bank's standard DBMS implementation process. LERC validated the system requirements and project scope before development, and utilities participated in validating the deployed system. The Bank provided capacity building, demonstrated the system at its public launch and formally handed it over to LERC (Sarpong, 2026b).

In contrast, ERA reported in September 2026 that its system was approaching user acceptance testing, and EWURA reported that testing had identified defects that the developer was correcting, while ZURA was still completing technical setup and had not yet introduced the system to consumers or its principal utility. These are materially different stages of implementation and should remain distinct throughout the study. It has to be noted that, for the Uganda–Tanzania DBMS project, the AfDB's two principal regulatory counterparts are Uganda's Electricity Regulatory Authority (ERA) and Tanzania's Energy and Water Utilities Regulatory Authority (EWURA). The Zanzibar Utilities Regulatory Authority (ZURA) participates through the support provided to mainland Tanzania, rather than through an independent AfDB support arrangement.

The Ghanaian experience provided an early demonstration of the platform's operational value. Following a fire that affected the PURC's physical information-technology infrastructure, information stored through the digital system contributed to the restoration of operations within a relatively short period. The experience demonstrated the importance of secure data storage, backup and business-continuity arrangements. A second phase is strengthening the integration between PURC, Ghana's Energy Commission and regulated utilities. The objective is to facilitate more direct information exchange between the systems used by the regulators and those operated by utilities. This represents a progression from the digitalisation of a regulator's internal processes towards a more interconnected regulatory information environment. Following the initial implementation at Ghana's Public Utilities Regulatory Commission, the AfDB expanded its support to other national regulatory institutions through DBMS projects and related digitalisation and institutional-strengthening initiatives. Participating and beneficiary institutions include:

- the Liberia Electricity Regulatory Commission;
- Uganda's Electricity Regulatory Authority;
- Tanzania's Energy and Water Utilities Regulatory Authority (EWURA), with the Zanzibar Utilities Regulatory Authority (ZURA) participating through the support provided to mainland Tanzania;
- regulatory institutions supported through related initiatives in Nigeria through the Nigerian Electricity Commission (NERC) and the Autorité de Régulation des Secteurs de l'Électricité et de l'Eau Potable (AREE) in Guinea; and
- the electricity regulatory structure supported under the Strengthening the Institutional Capacity for the Central African Republic Electricity Regulator project, which includes the development and implementation of a bespoke Management Information System.

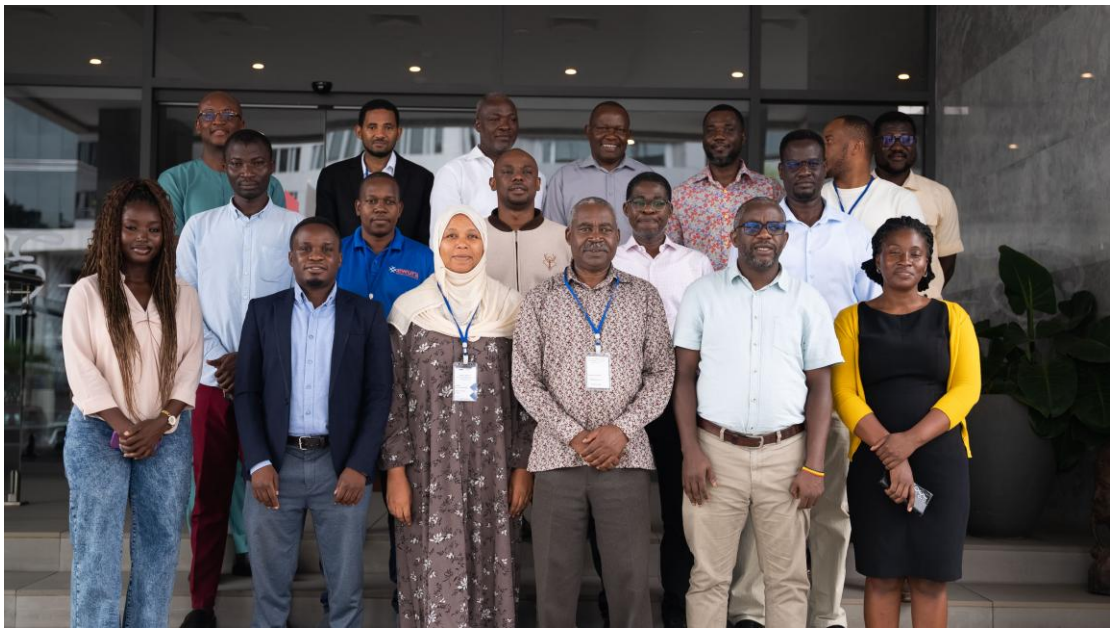
The African Development Bank is also supporting institutional-capacity and regulatory-information initiatives in other countries, including the Central African Republic. These interventions illustrate the wider use of digital systems and technical assistance to improve the organisation and performance of electricity regulation. At the regional level, the Bank has supported or initiated regulatory database systems involving regional institutions associated with ECOWAS, COMESA and SADC. These interventions are intended to improve information exchange, strengthen regulatory cooperation and support greater harmonisation across regional electricity markets.

2.4. Capacity Building and Change Management

The introduction of a DBMS requires changes in institutional procedures, staff responsibilities and the way regulators interact with regulated entities and the public. The AfDB-supported training therefore covered both technical skills and change management, addressing the use and administration of the platform alongside the organisational transition to digital regulatory processes. Operational users must understand how to enter, retrieve, verify and analyse information and how

to manage digital workflows. Information-technology personnel require more specialised training in system administration, database management, cybersecurity, maintenance, backup, recovery and future upgrades. The change management component complemented this technical preparation, recognising that successful adoption also requires adjustments to established working practices.

The Accra training for representatives from Uganda and Tanzania illustrates this approach. Participants included officials from Uganda's Electricity Regulatory Authority, Tanzania's Energy and Water Utilities Regulatory Authority and the Zanzibar Utilities Regulatory Authority[4]. Holding the training in Ghana provided a practical change management opportunity, allowing participants to learn from PURC's experience of adapting working practices and supporting staff adoption of the DBMS. This combination of formal training and peer-to-peer learning enabled participating authorities to see how the platform operates within an established regulatory institution.



Participants at the African Development Bank (AfDB) capacity-building bootcamp in Accra for energy regulators from Tanzania, Zanzibar, and Uganda, November 2025.
Source: Africa Energy Portal (2025), AfDB DBMS Training for Energy Regulators Underway in Accra, 17 November.

The AfDB also uses an initial handholding period to support the transition to institutional management of the system. According to Solomon Sarpong, the Bank generally provides the initial technological infrastructure and supports hosting during the implementation and early operational period. The consultant remains involved for a defined period following handover, after which the beneficiary regulator assumes responsibility for hosting, maintenance and future operational costs. This model is intended to build sustainability through institutional ownership. Regulators are expected to allocate resources for maintenance, retain trained personnel and integrate the platform into their regular budgets and operations. The reduction in paperwork, repetitive administrative work and manual processing can generate operational savings, creating an additional incentive for regulators to maintain the system. Change management is strengthened when the DBMS is integrated into the regulator's daily activities. When complaints, approvals, reporting and internal assignments are processed through the platform, the system becomes part of the institution's

[4] AfDB DBMS Training for Energy Regulators Underway in Accra | Africa Energy Portal

normal operating procedures rather than a separate technology project. Engagement with utilities, consumers, civil-society organisations and the media is also important to ensure that external stakeholders understand how to access and use the system.

2.5. Alignment with the AfDB's Energy-Sector Priorities and Regional Integration Agenda

The DBMS for Energy Regulators is aligned with the African Development Bank's Light Up and Power Africa priority, which seeks to expand access to reliable, affordable and sustainable modern energy. Achieving this objective requires investment in physical infrastructure as well as institutions capable of regulating increasingly complex electricity markets effectively. The initiative also supports the objectives of the Bank's New Deal on Energy for Africa, including the improvement of policy and regulatory environments, the strengthening of utilities and the mobilisation of public and private investment. Through the Africa Energy Sector Technical Assistance Program, the Bank provides knowledge, advisory services and technical assistance to help African countries and regional institutions address gaps in sector governance, regulation and institutional capacity.

At Ghana's Public Utilities Regulatory Commission (PURC), the DBMS helps staff retrieve consumer complaint records and supporting documents across regional offices. According to Alhadji Jabaru, a case referred to headquarters can now be accessed using its reference number, without sending a physical file to Accra. Managers can also review regional reports directly in the system.

This experience illustrates how digital tools can strengthen regulatory oversight and support more efficient access to information.

Source: Jabaru, A. (2026), interview conducted for this case study, 18 September.

Although the DBMS does not directly finance power-generation, transmission or distribution infrastructure, it helps establish the institutional conditions in which infrastructure investment can be developed and sustained. The programme also contributes to regional integration. Regional electricity trade requires cooperation between national regulators, greater consistency in regulatory approaches and reliable exchange of technical and market information. Database systems developed for regional institutions can support the harmonisation of reporting, enable comparison of electricity-sector performance and facilitate coordination across interconnected national markets.

The AfDB DBMS for Energy Regulators reinforces national regulatory institutions and facilitates information exchange at the regional level, thereby contributing to more transparent, efficient and harmonised power markets. The initiative also complements the Bank's investments in electricity access, utility performance, regional power pools and cross-border electricity trade.

3. Benefits for Africa's Electricity Sector

The benefits of the AfDB DBMS for Energy Regulators extend beyond the internal digitalisation of individual regulatory authorities. The initiative enhances regulatory processes, data management and information exchange, with the potential to reinforce electricity-sector governance, improve utility oversight, encourage more informed stakeholder participation and create a more predictable investment environment. Its application at both national and regional levels also establishes a foundation for greater regulatory cooperation and electricity-market integration across Africa.

3.1. Regulatory Effectiveness and Governance

Effective electricity regulation depends on the ability of regulators to obtain reliable information, process it efficiently and use it to make timely and consistent decisions. Manual and fragmented systems can delay tariff reviews, licensing procedures, complaints resolution and the monitoring of utility performance. They can also make it difficult for senior management to track the status of regulatory assignments and determine responsibility for pending actions. The AfDB DBMS for Energy Regulators addresses these constraints by integrating regulatory processes within a structured digital environment. Automated workflows allow applications, submissions and complaints to be assigned, reviewed and monitored through each stage of the regulatory process. Senior management can follow the progress of cases, identify delays and determine which department or officer is responsible for the next action. This improves internal coordination and reinforces institutional accountability.

Digitalisation can also strengthen the consistency of regulatory decisions. Standardised procedures and reporting formats reduce variations in how information is received and processed. The system creates a traceable record of submissions, reviews, recommendations, approvals and decisions, which supports greater procedural discipline and institutional continuity. Complaints management provides a practical illustration of these benefits. Consumers can submit complaints electronically, receive a ticket number and monitor progress without repeatedly visiting or contacting the regulator's offices. The regulator can track how the complaint is handled internally and by the relevant utility, monitor response times and identify unresolved cases. This enables more efficient consumer protection and provides management with information for assessing the responsiveness of regulated service providers.

The system can also improve regulatory resilience. In Ghana, information stored through the digital platform helped the Public Utilities Regulatory Commission restore operations following a fire that affected its physical information-technology infrastructure. The experience demonstrated how secure digital storage and backup arrangements can support business continuity and protect institutional information. Greater regulatory efficiency, traceability and institutional continuity enable regulators to fulfil their mandates more effectively. More efficient regulatory processes can, in turn, improve utility operations and service quality, reinforce consumer confidence and create a more predictable investment environment.

PURC's experience in Ghana also illustrates how access to complaint records improved management oversight across a decentralized regulator. Jabaru oversees regional consumer services and described the difficulty of supervising cases when supporting documents remained in separate offices. With the DBMS, he can inspect a complaint's history, identify the officer handling it and check the actions recorded, even when he is away from headquarters. He can also retrieve reports independently to compare them with information submitted by regional staff. The system records the user and timing of actions on a case. Jabaru reported that supervisors and auditors use those records to identify unattended complaints and check whether procedures have been followed. He also described an instance in which an unusual rise in complaints visible on his dashboard prompted him to contact a regional manager about an electricity outage. These examples support a finding of improved management visibility and traceability, as reported by PURC.

3.2. Improving the Quality, Availability and Use of Sector Data

Reliable data are essential for regulating the electricity sector. Regulators require technical, financial, commercial and operational information to assess tariffs, monitor service quality, evaluate

utility performance, enforce licence conditions and protect consumers. When information is incomplete, inconsistent or submitted through different formats, regulatory analysis becomes slower and less reliable.

The AfDB DBMS for Energy Regulators establishes a structured platform for collecting, storing and managing sector information. Standardised reporting templates can improve the consistency and comparability of data submitted by regulated entities. Automated controls can also help identify incomplete submissions, inconsistencies and reporting errors before the information is used for regulatory analysis. The platform also strengthens the use of information by providing analytical tools, dashboards, reports and visualizations that can turn raw data into indicators for regulatory monitoring and decision-making. Regulators can use these functions to compare utility performance, identify emerging service problems and monitor compliance with technical, financial and service-quality requirements.

Digital field-data collection can further improve accuracy and timeliness. Information gathered during inspections and surveys can be entered through tablets or other digital devices and transmitted directly to the central system. This reduces repeated manual entry and allows the information to be analysed more rapidly. Geotagging adds a spatial dimension to regulatory analysis, while the mapping of complaints, incidents and service interruptions enables regulators to identify areas where similar problems recur.

A concentration of complaints in a particular location may indicate a defective feeder, an overloaded transformer or another network problem requiring intervention by the utility.

3.3. Enhancing Transparency and Accountability

Transparency requires regulatory information, procedures and decisions to be accessible and understandable to affected stakeholders. Accountability requires regulators and regulated entities to explain their actions, comply with established requirements and respond to identified problems. Both depend on accurate information and processes that can be monitored and verified. The AfDB DBMS for Energy Regulators supports these objectives by creating a traceable digital record of regulatory submissions, reviews, approvals and decisions. The system can show when information was submitted, who reviewed it, what action was taken and whether the process was completed within the required timeframe. The platform can also make information more accessible to consumers, civil-society organisations, the media, investors and other stakeholders. Digital access to regulatory decisions, tariffs, performance indicators and service-quality information can improve public understanding of the regulator’s work. It can also enable stakeholders to participate more effectively in consultations and tariff-review processes.

Ghana’s experience illustrates the importance of combining digital access with stakeholder capacity building. Following the initial implementation at PURC, civil-society organisations and media representatives were introduced to the platform and provided with information on regulatory and tariff processes. According to Solomon Sarpong, this engagement helped stakeholders better understand the information underlying a subsequent tariff review and contributed to a more informed public discussion. Complaints management also reinforces accountability, because consumers can monitor the progress of their cases, while the regulator can assess how quickly utilities respond and whether the required corrective measures have been implemented. Aggregated complaints data can reveal recurring service problems and provide evidence for regulatory intervention. Greater transparency can also improve investor confidence. Investors require clear procedures, reliable sector information and confidence that regulatory decisions will be made consistently. Harmonised reporting requirements, improved access to information and

greater traceability of regulatory processes allow the DBMS to foster a more predictable and enabling environment for investment in electricity infrastructure and services.

3.4. Facilitating Regional Electricity-Market Integration

Africa's electricity systems are becoming increasingly interconnected through regional power pools, cross-border transmission infrastructure and electricity-trading arrangements. Regional electricity markets can enable countries to share generation resources, improve system reliability and reduce the cost of electricity supply. Their effectiveness, however, depends on cooperation among national regulators and greater alignment of regulatory procedures, technical requirements and market information. Differences in national reporting systems can make regional coordination more difficult. Regulators and regional institutions may collect similar information using different definitions, formats, reporting periods and performance indicators. These variations limit the comparability of sector data and complicate the monitoring of regional markets.

Regional applications of the AfDB DBMS can support the harmonisation of information and reporting practices. Common data structures and reporting templates can enable participating institutions to collect and exchange comparable technical, commercial and regulatory information. This can improve the monitoring of cross-border electricity trade and support more coordinated regulatory decisions. The Bank's engagement with regional institutions associated with ECOWAS, COMESA and SADC demonstrates the potential application of the initiative beyond national regulatory authorities. At the regional level, authorised institutions can use shared information to monitor developments across participating countries, compare sector performance and identify regulatory differences that may constrain electricity trade.

Improved information exchange can also support the progressive alignment of market rules and regulatory practices, as regulators can learn from one another, identify good practices and develop more consistent approaches to issues such as licensing, tariffs, service quality and utility-performance monitoring. Regional platforms can therefore provide both an operational tool and a mechanism for regulatory cooperation. The DBMS does not, by itself, create an integrated regional electricity market. Market integration also requires physical interconnections, compatible technical standards, effective commercial arrangements, political commitment and enforceable regional rules. However, by improving the availability and comparability of information and strengthening cooperation among regulatory institutions, the AfDB DBMS for Energy Regulators provides an important institutional foundation for regional electricity-market integration.

4. Lessons Learned and Good Practices

The implementation of the AfDB DBMS for Energy Regulators provides lessons for regulatory institutions and development partners seeking to introduce similar digital systems. Experience to date shows that successful digital transformation depends on institutional ownership, appropriate system design, reliable data, staff capacity and sustainable operational arrangements. The technology must respond to clearly identified regulatory needs and become integrated into the regulator's daily activities.

4.1. Implementation Challenges and Lessons Learned across Countries

Discussions with stakeholders in Ghana, Liberia, Nigeria, Uganda, mainland Tanzania and Zanzibar show that implementing a DBMS involves much more than simply installing new software. The participating national energy regulators entered the programme with different institutional

mandates, operating procedures, levels of digital maturity and relationships with regulated utilities, and these differences influenced the scope of each system, the pace of implementation and the type of support required. The interviews also show that Ghana's comparatively advanced implementation resulted from several years of institutional learning rather than from a straightforward technical deployment. Ghana provides the clearest evidence to date, because the Public Utilities Regulatory Commission (PURC) is using the DBMS in its operations and is progressing to a second phase. Before its introduction, PURC relied substantially on paper files and faced difficulties monitoring complaints handled by its geographically dispersed regional offices. A complaint submitted in Tamale, Bolgatanga or Wa could not easily be monitored from the Commission's central office in Accra. Escalating a case therefore required the regional office to assemble the relevant documents and send them physically for review. According to Alhadji Jabaru, the DBMS was therefore developed around a specific operational need: enabling PURC to monitor complaints, retrieve supporting records and supervise regional activities from a central point (Jabaru, 2026).

The Ghanaian experience also demonstrates the importance of adapting the system to the regulator's existing procedures. PURC worked with the consultant to translate its complaint-management and document-management processes into the platform. This tailoring made the system relevant to the institution's day-to-day work, but the development and consultation process took approximately eight months to one year from the initial discussions to launch. The principal challenge during this period was not the software itself, but securing the participation and acceptance of internal and external stakeholders (Jabaru, 2026). Staff adoption was a particular difficulty during the early stages, as some employees were accustomed to maintaining paper records, and at least one staff member continued filing complaints manually because of limited ability to use a computer. PURC responded by providing training and technical support and incorporating the DBMS into its standard operating procedures. Supervisors and auditors were also required to verify that cases had been entered into the system and that backlogs were not accumulating. This experience shows that training alone may not be sufficient. Use of the platform must also be embedded in institutional procedures, supervision and accountability mechanisms if it is to replace established manual practices.

Over time, the system became part of PURC's operational controls. Managers can retrieve complaint records, review the actions taken by regional offices and validate reports directly from the platform. Timestamps provide a chronological record of when cases and documents were entered or processed, limiting the possibility of backdating activities. PURC has also incorporated the DBMS into its annual system audits. These functions have improved the visibility and traceability of regulatory activities across the Commission's regional network. Sustainability in Ghana has depended on building internal capacity rather than relying indefinitely on the external consultant. PURC increased its internal Information and Communication Technology (ICT) capacity and designated staff members as DBMS champions who can help colleagues resolve routine problems. External assistance is retained for major system changes, while routine support is provided internally. Ghana's experience therefore suggests that sustainability arrangements (internal technical support, data backup, equipment and system administration) should be established during the implementation phase rather than after the external assignment has ended.

For a different perspective, the Nigerian's experience highlights the importance of allowing sufficient time for handover and knowledge transfer. According to Abdullahi Adamu, Director of Research and Data Analytics at the Nigerian Electricity Regulatory Commission (NERC), the handover period provided under the original contract was too short. NERC consequently financed an additional six-

month engagement with the implementing organisation, to provide practical support and further knowledge transfer and adjustments to the system. This experience suggests that future contracts should include a realistic transition period and adequate resources to prepare regulatory staff to operate and maintain the platform (Adamu, 2026). Liberia's experience highlights the value of involving the regulator at two stages: when defining what the system must do and when validating it for operational use. Before development began, the Liberia Electricity Regulatory Commission (LERC) validated the institutional needs assessment, business case, system specifications and project scope. LERC and the utilities then participated in validating the deployed Regulatory Database Management System (RDBMS), and the project included capacity building to support its day-to-day use. This sequence gives the regulator a basis for assessing the system against agreed requirements and for evaluating later requests for additional functionality as potential enhancements (Sarpong, 2026).

Institutional continuity was another important factor. Ernie Ofori observed that the staff directly involved in Ghana's implementation remained relatively stable even when the leadership of the institution changed. This helped preserve knowledge of the system's objectives and allowed implementation to progress from the first phase to further development. In other countries, lengthy procurement and implementation processes created a risk that the people who participated in the original needs assessment would move, retire or no longer remember the problems the system was intended to solve. The lesson is that extended delays can weaken institutional memory and force a regulator to restart part of the requirements and engagement process (Ofori, 2026). The Ghana case also illustrates the need for phased implementation. The first phase established the institutional database, formalised relevant procedures and introduced functions such as complaint management and consumer protection. The second phase is intended to strengthen connections with utilities and other licensed operators across the electricity supply chain. It is also expected to facilitate greater coordination between Ghana's financial and technical regulatory functions and to incorporate additional applications, including meter-testing information. This phased approach enabled PURC to consolidate its internal processes before attempting wider integration with external institutions (Ofori, 2026).

Experience across the programme points to procurement as a broader challenge. Ofori explained that separate procurement exercises were undertaken for different countries. Although the underlying functional specifications remained broadly consistent, the software products developed for individual regulators could differ. Repeating the procurement process for each country increased the time required for deployment. It also created a need to ensure that different platforms could communicate in the future. Maintaining common specifications and application programming interfaces is therefore important for interoperability, particularly if national systems are eventually expected to exchange information through regional regulatory platforms (Ofori, 2026).

The East African implementations highlight a different set of difficulties. In Uganda, ERA had worked on the system for approximately three years but was still preparing for user-acceptance testing at the time of the interview. The system had therefore not been fully rolled out, and its anticipated benefits could not yet be treated as verified results. Nevertheless, ERA's underlying operational challenge was clearly defined. The regulator relied heavily on quarterly information submitted by licensees and on a relatively small number of consumer complaints. Aminah Namuddu estimated that only about 20 per cent of customers were aware of ERA's redress role and that the institution received approximately 100 to 1,000 complaints annually despite serving a market of around 15 million grid-connected people. Quarterly reporting could also leave the regulator waiting several months for information on reliability. The proposed system is intended to supplement these sources

through public outage reporting, analytics and site-audit functions, but its effectiveness will need to be assessed after operational deployment (Magezi and Namuddu, 2026).

Mainland Tanzania demonstrates the difficulty of implementing one project across several independent regulators progressing at different speeds. Mtumwa Simba explained that the same development arrangement covered ERA in Uganda, EWURA in mainland Tanzania and ZURA in Zanzibar. Because each regulator had its own level of readiness and implementation timetable, delays affecting one institution could influence the progress of the others. From EWURA's perspective, separate contractual arrangements could give each regulator greater control over its own timetable and implementation responsibilities (Simba, 2026). The Tanzanian case also underlines the importance of integration with existing systems. EWURA already had a licensing platform and expected the DBMS to connect with that system, as with the information systems of service providers, where technically possible. Some information could be transferred electronically, while data that had not yet been digitalized by service providers would still need to be entered through a web interface. At the time of the interview, several performance indicators were still being processed using spreadsheets and email, making report preparation burdensome for the responsible departments. The immediate challenge was therefore not only to introduce the new platform, but to integrate data originating from systems with different levels of digital maturity (Simba, 2026).

Zanzibar illustrates why stakeholder engagement should begin before technical configuration is completed. ZURA had undertaken training and provided the technical information required for integration, including application programming interface and domain configuration details. Proposed functions included complaint intake, outage reporting, licensing and permits, and the validation of performance reports. However, at the time of the interview, the system was not yet operational and ZURA had not engaged its principal utility, the Zanzibar Electricity Corporation, or consumers because the technical setup and data preparation had not been completed. This sequence creates a risk that important user requirements may only emerge after substantial configuration has already taken place. Early engagement with utilities and consumers can help validate workflows and improve readiness before launch (Khamis, 2026).

The country experiences indicate that effective implementation requires a clear operational problem, stable institutional ownership, early stakeholder engagement and continued staff involvement. Procedures should be reviewed and, where necessary, harmonised before they are automated, and procurement and contracting arrangements should reflect the readiness and responsibilities of each regulator, while common technical specifications should be retained to support future interoperability. Training should be continuous and reinforced through standard operating procedures, supervision and system audits. Finally, implementation plans should cover internal ICT capacity, infrastructure, integration, data backup and maintenance from the outset. Ghana demonstrates that these measures can progressively embed the DBMS in a regulator's daily operations, while the experiences of Uganda, mainland Tanzania and Zanzibar show the risks of prolonged implementation, uneven institutional readiness and delayed stakeholder engagement.

4.2. Implications for Future Implementation and Replication Across Africa

The challenges addressed by the AfDB DBMS are shared by many African energy regulators. Manual reporting, fragmented information systems, limited data exchange and difficulties in monitoring regulatory processes are not confined to a single country or institution. Therefore, the DBMS initiative has considerable potential for replication across the continent. The experience of Ghana provides an initial operational model, while implementation in Liberia, Uganda, Tanzania,

Zanzibar, Nigeria and Guinea demonstrates that the approach can be adapted to different regulatory environments. Engagement with regional institutions associated with ECOWAS, COMESA and SADC also indicates that the platform can support both national regulation and regional cooperation. Replication should follow a flexible framework rather than a uniform technological model. Core functions—including regulatory reporting, complaints management, workflow monitoring, data analysis and public-information access—can be standardised. However, system configuration should reflect each institution's legal mandate, market structure, technological capacity and regulatory priorities.

The country experiences gathered from interviews with local stakeholders indicate that future DBMS projects should begin with a detailed assessment of the regulator's operational problems, existing procedures, digital infrastructure and relationships with regulated entities. Ghana's experience shows that the platform is more likely to become part of daily operations when it is designed around identified institutional needs, incorporated into standard operating procedures and supported by management, internal ICT personnel and trained system champions. Staff continuity is also important for preserving knowledge throughout implementation, particularly where procurement and development extend over several years. Implementation and contracting arrangements should reflect the readiness and responsibilities of each beneficiary institution.

The experience of Uganda, mainland Tanzania and Zanzibar shows that grouping independent regulators under a shared implementation timetable can create delays when they progress at different speeds. At the same time, maintaining common functional specifications and interoperability requirements remains important for future national and regional data exchange. Stakeholder engagement should begin during requirements definition, and continue through testing, deployment and system improvement. Utilities and regulatory staff should help validate workflows and reporting requirements, while consumers should be informed about new complaint and information channels before the system becomes operational. User-acceptance testing should confirm that the agreed functions work as intended, but it should not replace broader institutional preparation and stakeholder engagement. Implementation plans should also identify who will operate and maintain the system after handover. In Liberia, LERC cited limited staffing capacity as a barrier to adopting the system after it was formally handed over (Sarpong, 2026).

Finally, sustainability arrangements should be established from the outset. They should cover internal technical capacity, hosting, cybersecurity, system integration, data backup, maintenance and future upgrades. The beneficiary regulator should progressively assume responsibility for system administration, while external support is reserved for specialised development or major modifications. In countries where several public institutions and development partners are involved, as in the Central African Republic project, early coordination can help align requirements, avoid duplication and make better use of available technical and financial resources. The Nigerian example also illustrates the need to plan for system evolution as regulatory requirements change. At the time of the interview, NERC was preparing a proposal for a second version of its DBMS Portal. Adamu explained that this reflected changing technology and operational requirements, including an evolving regulatory framework in which state-level regulators assume responsibilities alongside the national regulator. This experience reinforces the importance of adaptable system design and provision for future upgrades, so that the platform remains relevant as institutional responsibilities and information needs evolve (Adamu, 2026).

Future replication may also incorporate emerging technologies. Artificial intelligence could support data analysis, identify unusual reporting patterns, assist with licensing and certification, and improve access to regulatory information. Such applications should be introduced progressively

and supported by appropriate data-governance, cybersecurity and human-oversight arrangements. The strongest basis for replication will be evidence of practical improvements in regulatory performance. Documenting reductions in processing times, improvements in data quality, more effective complaints resolution and increased stakeholder access to information will help demonstrate the value of the platform and encourage adoption by additional regulatory authorities. The AfDB DBMS for Energy Regulators therefore offers a scalable framework for regulatory digitalisation across Africa. Its replication should remain institution-led, adapted to national and regional circumstances, and supported by capacity building, sustainable financing and measurable performance objectives.

4.3. Future opportunities: Artificial intelligence and data-driven regulation

The potential contribution of artificial intelligence (AI) should be considered in relation to the different stages reached by national regulators. Ghana has an operational system and is progressing to a second phase, while Uganda, mainland Tanzania and Zanzibar were still completing development, testing or integration at the time of the interviews. The immediate opportunity is therefore not to introduce the same AI applications in every country, but to build progressively on each regulator's existing data, institutional capacity and operational priorities.

Ghana offers the clearest basis for the gradual introduction of AI-supported regulatory functions. PURC already uses the DBMS to monitor complaints handled by its regional offices, retrieve records, validate reports and identify cases that have not been addressed within the expected period. The system's timestamps also allow managers and auditors to reconstruct the sequence of actions taken on individual cases. As part of the second phase of PURC's DBMS implementation, AI-supported analysis is being considered to examine complaints across regions, identify recurring problems and detect geographical or operational patterns that may not be apparent from individual local cases. For example, AI-supported analysis could group complaints relating to outages, billing, connections, meter accuracy or poor customer service and identify where particular problems occur repeatedly. This would help PURC distinguish isolated cases from wider service-delivery failures requiring regulatory intervention. The objective would not simply be to process complaints more quickly, but to use their underlying patterns to prevent similar complaints from recurring. Ghana's planned second-phase integration with utilities could strengthen this approach by allowing complaint information to be compared with utility performance and service records. The proposed integration of meter-testing information could also support the identification of repeated billing or metering problems. These applications would build on the monitoring and traceability already established through the DBMS rather than introduce AI as a separate system.

The experience of Uganda presents a different opportunity and an important limitation. ERA currently relies substantially on quarterly reports submitted by licensees and receives only approximately 100 to 1,000 complaints annually, despite an estimated 15 million people being connected to the grid. Aminah Namuddu also estimated that only about 20 per cent of customers were aware of ERA's consumer-redress role. Under these conditions, AI analysis based solely on existing complaints could produce an incomplete picture because the available information does not adequately represent the experience of electricity consumers (Magezi and Namuddu, 2026). ERA's proposed public outage-reporting function could progressively improve this evidence base by enabling consumers to report service interruptions directly. Once sufficient information is collected, AI could help validate incoming reports, identify clusters of outages and prioritise areas for investigation or site audits. Complaint and outage data could also be compared with licensees' quarterly submissions, helping the regulator identify inconsistencies and obtain an earlier indication of reliability problems. Nevertheless, AI cannot compensate for limited public awareness or

insufficient reporting. Consumer outreach, accessible reporting channels and utility-data integration must first generate a sufficiently representative and reliable body of information.

In mainland Tanzania, the priority is to replace fragmented information flows with structured digital data. EWURA was still processing several performance indicators through spreadsheets and email, while integration with its existing licensing platform and the systems of service providers remained part of the proposed implementation. Before AI can be applied effectively, these different sources must be brought together using consistent definitions and reporting formats. Once this foundation is established, AI could assist EWURA in analysing utility performance indicators, identifying late or inconsistent submissions and highlighting trends requiring regulatory attention. It could also support the comparison of information submitted through the DBMS with data obtained directly from service-provider systems. However, introducing advanced analytical tools before resolving integration and data-quality issues would risk automating existing inconsistencies rather than improving decision-making.

In Zanzibar, the DBMS was still being configured for complaint intake, outage reporting, licensing, permits and performance monitoring. ZURA had not yet engaged consumers or its principal utility, the Zanzibar Electricity Corporation, because the technical setup and data preparation had not been completed. In this context, the first requirement is to complete configuration, validate the system with the utility and users, and establish reliable reporting practices. AI applications could subsequently support the classification of complaints, analysis of outages and assessment of utility performance, but only after stakeholders are actively using the platform and producing sufficient data.

The country experiences also have implications for regional AI applications, as the national DBMS platforms may use different software products, even where their functional specifications are similar. Any future regional analysis will depend on common data definitions and effective interfaces between national systems, because without harmonised indicators, an AI tool could incorrectly compare information collected according to different methodologies. The work already undertaken to maintain common specifications and application programming interfaces is consequently important not only for system interoperability, but also for the future use of advanced analytics across countries. Based on these experiences, AI could be introduced through specific regulatory use cases rather than as a general technological layer. Ghana could begin with complaint-pattern analysis and the comparison of consumer cases with utility-performance information. Uganda could apply AI to outage reporting and reliability monitoring once participation and data volumes improve. Mainland Tanzania could use it to analyse structured performance indicators after completing system integration, while Zanzibar should first concentrate on stakeholder engagement, system adoption and data generation.

Across all four cases, AI should support rather than replace regulatory judgement. Decisions affecting tariffs, licences, sanctions, investment approvals or consumer rights must remain subject to review by authorised regulatory personnel. Data quality, cybersecurity, privacy, transparency and the possibility of biased or incomplete analysis will also require clear governance arrangements. The principal lesson from the national experiences is that AI will only be as effective as the regulatory data and institutional processes on which it depends. Strengthening the DBMS, expanding stakeholder participation and embedding data use in daily regulatory work are necessary steps towards faster and more evidence-based regulation.

5. Conclusion

The effectiveness of Africa's power sector depends greatly on the capacity of national regulatory institutions to manage increasingly complex markets, monitor utility performance, protect consumers and provide predictable conditions for investment. Yet many regulators continue to operate with fragmented information systems, manual procedures, inconsistent reporting and limited information exchange. The AfDB DBMS for Energy Regulators addresses these constraints by supporting the transition towards more automated, integrated and data-driven regulatory processes. Ghana provides the most developed operational experience examined in this case study. At the Public Utilities Regulatory Commission (PURC), the DBMS was designed to address practical difficulties in monitoring complaints and supervising regional offices dispersed across the country. It has enabled managers to retrieve complaint records, follow the actions taken on individual cases, validate regional reports and access documents remotely. The use of timestamps and system-based audits has also strengthened the traceability of regulatory activities. These benefits remain primarily supported by qualitative evidence, as verified before-and-after performance measurements were not available. Nevertheless, Ghana demonstrates how a digital platform can become part of a regulator's operating model when it is adapted to institutional needs, incorporated into standard operating procedures and supported by management, internal information and communication technology personnel and trained system champions.

Ghana's experience also shows that digital transformation is an institutional process rather than a straightforward software deployment. Stakeholder acceptance and differences in staff digital capabilities created challenges during the initial implementation. PURC addressed these issues through training, internal technical support, supervision and the integration of DBMS requirements into its operating and audit procedures. Staff continuity helped preserve institutional knowledge while the system evolved from its first phase towards further integration with utilities and other sector actors. These lessons highlight the importance of institutional ownership, continuous capacity building, data backup, technical support and long-term maintenance arrangements.

Nigeria and Liberia provide further perspectives on regulatory digitalisation. In Nigeria, NERC's operational experience indicates that centralised submissions and automated reminders have improved reporting timeliness and supported the preparation of regulatory publications. Its decision to finance six additional months of technical support also highlights the importance of realistic handover periods and knowledge transfer (Adamu, 2026). In Liberia, the launch of LERC's Regulatory Database Management System in March 2024 extended African Development Bank support for strengthening regulatory information management (Teh, 2024).

The experiences of Uganda, mainland Tanzania and Zanzibar provide complementary lessons from systems that were still being developed, tested or integrated at the time of the interviews. In Uganda, the DBMS is expected to address delays associated with quarterly licensee reporting and the limited number of consumer complaints available to support reliability decisions. However, its anticipated benefits cannot be treated as demonstrated results until the system is operational and its performance can be assessed. In mainland Tanzania, reliance on spreadsheets and email for processing performance indicators illustrates the need for structured and integrated data, while the implementation experience shows how a shared project covering independent regulators can be delayed when participating institutions progress at different speeds. Zanzibar further demonstrates the importance of engaging utilities and consumers before deployment is completed, so that operational requirements can be validated and stakeholders are prepared to use the new system.

Taken together, these experiences reinforce the value of the needs assessment that the Bank conducts as a standard first step in every DBMS deployment. The assessment examines the regulator's operational challenges, existing procedures, digital infrastructure and institutional capacity. Its findings inform the system requirements and scope. The Bank typically commissions the assessment separately from system development and deployment. Where a single contract covers both functions, the work is divided into distinct stages, with the outputs of each stage validated before the next begins (Sarpong, 2026). The findings of the needs assessment should inform procurement and contracting arrangements, taking into account each regulator's readiness and clarifying its responsibilities during implementation. Common technical specifications and application programming interfaces should support future interoperability, while system design should reflect the workflows and reporting requirements reviewed during the assessment. As deployment approaches, user acceptance testing should be accompanied by stakeholder engagement and change management to prepare the regulator for day-to-day use. Where procurement or implementation extends over a long period, documenting the rationale for key decisions and organising handovers when staff change can preserve institutional knowledge and keep the system aligned with the operational needs identified at the outset.

Although each DBMS must reflect the beneficiary country's institutional, regulatory and operational context, the systems share broadly similar core functions. The African Development Bank should therefore consider developing a standardised core platform with configurable modules that can accommodate national requirements. Such an approach could reduce repeated development and procurement work, promote the reuse of technical knowledge and software components, and enable faster, more cost-effective deployment. A scalable platform could also help the African Development Bank respond more efficiently to growing demand for regulatory digitalisation, while preserving each regulator's ability to adapt workflows, reporting requirements and system interfaces to its mandate.

The planned *Strengthening the Institutional Capacity for the Central African Republic Electricity Regulator* project reinforces these lessons. Its proposed combination of regulatory and technology-gap assessments, defined business requirements, a tailored Management Information System, user-acceptance testing, capacity building and stakeholder consultation reflects the broader institutional approach required for sustainable digitalisation. Its attention to security, hosting, maintenance, business continuity, manuals and knowledge transfer also illustrates how sustainability arrangements can be incorporated from the design stage. These measures can help integrate the platform into daily regulatory activities and progressively reduce dependence on external service providers.

The data foundations created through the DBMS could also support more advanced regulatory analysis as the systems mature. Artificial intelligence (AI) could eventually help regulators classify complaints, identify recurring service problems, detect unusual performance patterns and prioritise matters requiring investigation. The appropriate applications will differ by country. Ghana could build on its accumulated complaint and operational records, while Uganda would first need to expand consumer participation and obtain more representative outage data. Mainland Tanzania must continue structuring and integrating information currently exchanged through spreadsheets and email, while Zanzibar needs to complete configuration and stakeholder engagement. AI should therefore be introduced progressively through clearly defined regulatory use cases and should support, rather than replace, human judgement. Its effectiveness will depend on reliable data, strong governance, cybersecurity, transparency and appropriate safeguards for consumer and institutional information. At the regional level, harmonised reporting and improved information

exchange can strengthen cooperation among national regulators, regional regulatory institutions and power pools. A DBMS cannot by itself create an integrated electricity market, but compatible national platforms can provide an important informational and institutional foundation for regulatory alignment, cross-border electricity trade and the progressive development of the African Single Electricity Market. This will require common definitions and indicators even where countries use different software products.

The AfDB DBMS for Energy Regulators represents more than an information-technology investment; it is an institutional-strengthening instrument through which regulators can improve the availability and use of information, strengthen oversight and provide more transparent and responsive services to consumers and regulated entities. The country experiences confirm that there is no single implementation path, and replication should be phased and adapted to each regulator’s mandate, institutional maturity and national context. With strong ownership, realistic implementation arrangements, stakeholder participation, sustained capacity building and measurable performance indicators, the programme can provide a scalable foundation for more efficient, accountable and data-driven electricity regulation across Africa.

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