

The Energy Regulation Centre of Excellence (ERCE)

**Exclusive Tailored Training Programs on Electricity Markets for the Year
2025**



**Seven Dynamic Power Courses Shaping the Future of Africa's Electricity
Markets**

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'Unlock the Future of Energy: Master Electricity Transmission, Market Trading, Regulation, and Regional Systems with Our Expert-Led Course Series!'

The Seven Dynamic Power Courses Shaping the Future of Africa's Electricity Markets is prepared by the Energy Regulation Centre of Excellence.

The unique courses were designed by Dr. Geoffrey Aori Mabea in collaboration with other energy experts across the African Continent.

1. Preface

The Eastern Africa Power Pool (EAPP) Regional Power Trade Conference, held from December 9 to 11, 2024, in Mombasa, Kenya, focused on advancing regional energy markets and preparing for the launch of the Day-Ahead Market (DAM) in early 2025. The conference brought together key stakeholders, including ministers, utility leaders, regulators, development partners, and international experts.

Key Outcomes:

1. **Commitment to Regional Integration:** EAPP ministers for energy reaffirmed their dedication to enhancing regional integration, recognizing the substantial benefits of increased power trade, such as improved energy reliability and resilience to climate shocks.
2. **Sharing of Best Practices:** The conference facilitated the exchange of experiences and knowledge from other global power pools, providing valuable insights into market integration and renewable energy development.
3. **Preparation for the Day-Ahead Market Launch:** Discussions centred on the roadmap and technical preparations necessary for the successful launch of the DAM in early 2025. This included developing market rules, a trading platform, and the required market operator and grid coordination functions.
4. **Enhanced Collaboration Among Stakeholders:** The conference served as a platform to improve collaboration among EAPP stakeholders, fostering a unified approach to regional power trade and coordination.

Capacity Building Initiatives:

In line with the conference's objectives, the Energy Regulation Centre of Excellence (ERCE) is set to conduct training sessions on electricity markets. These training programs aim to equip stakeholders with the necessary skills and knowledge to effectively participate in and manage the evolving regional power market. The ERCE's capacity-building efforts are crucial for ensuring that all involved parties are well-prepared for the upcoming market developments.

2. Background

The **Energy Regulators Association of East Africa (EREA)** is a regional consortium comprising National Regulatory Institutions (NRIs) from the **East African Community (EAC)** member states. Established through the ratification of a formal Constitution in 2013 and a **Memorandum of Understanding (MOU)** signed in 2008, the member institutions collectively aimed to forge a comprehensive and resilient **EAC Energy Union** that would drive regional energy integration and cooperation.

Currently, EREA encompasses Ten (10) active members from seven EAC countries. These include the **Energy and Water Utilities Regulatory Authority (EWURA)** of Tanzania, the **Energy Petroleum Regulatory Authority (EPRA)** of Kenya, the **Autorité de Régulation du Secteur de l'Électricité (ARE)** of the **Democratic Republic of Congo (DRC)**, the **Zanzibar Utility Regulatory Authority (ZURA)**, and the **Petroleum Authority of Uganda (PAU)**. Additionally, the association includes the **Electricity Regulatory Authority (ERA)** of Uganda, the **Rwanda Utilities Regulatory Authority (RURA)**, the **Petroleum (Upstreaming)**

Regulatory Authority (PURA) of Tanzania, National Electricity Authority of Somalia and the **Autorité de Régulation des Secteurs de l'Eau Potable et de l'Énergie (AREEN)** of Burundi. Advanced dialogues are ongoing with **South Sudan** to assist in the establishment of a regulatory authority, while collaborative efforts continue directly with the **Ministry of Mines and Dams**.

Formally constituted under the ratified 2013 Constitution and **registered** by the Government of Tanzania in 2014, EREA was officially designated by the **8th Meeting of the Sectoral Council on Energy Ministers of the EAC on 21st June 2013**, as the central forum for energy regulation within the region. The association's mission is anchored in the development of an integrated and sustainable **Energy Union** for the EAC, promoting synergy in the regulation of energy resources and services.

The core functions of EREA encompass the following strategic priorities:

1. **Harmonization of Energy Policies and Regulatory Frameworks:** EREA plays a pivotal role in the alignment and standardization of energy policies across EAC member states. This includes facilitating the development of a coherent regulatory regime that supports seamless regional integration and fosters cross-border energy cooperation.
2. **Advocacy for Regulatory Independence:** EREA champions the autonomy of regulatory bodies in the electricity and petroleum sectors, ensuring that regulatory authorities operate without undue political interference, thus guaranteeing the integrity of the energy market and consumer protection.
3. **Promotion of a Competitive and Integrated Energy Market:** EREA is instrumental in establishing a regional power pool and competitive energy markets that foster economic efficiency and energy security across EAC nations. This entails developing robust mechanisms for electricity and petroleum regulation that enable market liberalization and energy exchange within the region.
4. **Sustainable Capacity Building:** EREA is committed to the development and strengthening of human and institutional capacity within the energy regulatory landscape. By implementing training programs, workshops, and knowledge-sharing platforms, EREA ensures the continuous professional development of regulatory staff, enhancing their ability to respond to evolving energy sector challenges and contributing to long-term, sustainable energy governance across the region.
5. **Facilitating Regional Cooperation and Integration:** The association works to enhance regional collaboration in energy governance, aligning policy frameworks, regulations, and operational standards to ensure that EAC member states move toward a unified and integrated energy market that supports sustainable growth and development.

Through these initiatives, EREA aims to create a dynamic, sustainable, and transparent energy ecosystem that promotes energy access, security, and affordability, while also fostering economic integration, environmental sustainability, and regional resilience within the EAC.

In alignment with regional and continental objectives, energy regulators within the East African Community (EAC) have taken into account the priorities outlined in the **African Union's Agenda 2063**, the **United Nations Sustainable Development Goals (SDGs)**, and the **African Development Bank (AfDB) Energy Sector Capacity Building Diagnostic & Needs Assessment**—all of which highlight the critical importance of capacity building for energy regulation. Furthermore, the **Executive Council (EXCO)** of EREA has reviewed the **Independent Regulatory Board (IRB) Capacity Building Recommendations** of 2020, the **Framework for Regulatory Oversight** for the **EA-SA-IO Energy Market** of 2020, and the capacity gaps identified by the

AfDB's **Electricity Regulatory Index (ERI)** in its annual surveys. These efforts have provided the foundation for identifying the regulatory capacity challenges across the region.

Drawing from these assessments, the EREA Secretariat, in collaboration with key stakeholders, conducted an in-depth skills gap analysis and developed a comprehensive curriculum tailored to address the specific regulatory needs of the region.

In 2022, EREA established the **Energy Regulation Centre of Excellence (ERCE)**, a strategic initiative designed to provide sustainable, high-impact capacity building for the region and across the African continent. To support this endeavour, a **five-year strategic plan (2022/23 – 2026/27)** was developed, outlining a clear roadmap for the implementation of capacity-building programs aimed at strengthening energy regulation across the region. ERCE's establishment marks a critical step in addressing the long-standing challenge of developing sustainable regulatory capacity in East Africa.

Moreover, in 2024, the World Bank supported the development of a Capacity Building Program for the **Independent Regulatory Board (IRB)** in Eastern Africa, formally recognizing ERCE as the central institution responsible for coordinating and delivering specialized training initiatives across the region.

The **Energy Regulation Centre of Excellence (ERCE)** will leverage the wealth of experience from both practicing and retired energy experts within the East African regulatory bodies, utilities and global Partners to ensure the relevance and effectiveness of its training programs. The centre's training offerings will also be cost-effective, as they will be conducted within the region, minimizing the financial burden of international training programs. ERCE's programs will be designed to enhance the capacity of energy regulators, ensuring they can effectively manage emerging challenges in energy markets and regulatory frameworks.

The **Vision and Mission** of the **Energy Regulation Centre of Excellence (ERCE)** are outlined below.

3. Vision and mission

2.1 Mission

"To progress the EAC Energy Union through Sustainable Capacity Building."

2.2 Mission

"To offer an opportunity for advancement of learning through teaching, exchange of ideas and experiences and research to fulfil the East African community's potential to transform the energy market."

4. Introduction

The **Advanced Electricity Market Courses** are designed to provide participants with an in-depth understanding of the principles, operations, and future trends in electricity markets. These courses are tailored to address the dynamic needs of electricity markets, focusing on regional integration, market design, trading mechanisms, and regulatory frameworks. By emphasizing both theoretical concepts and practical applications, the courses prepare participants for the evolving landscape of electricity markets, with a particular focus on Africa's regional power pools and the Africa Single Electricity Market (AfSEM).

The courses will be provided by the **Energy Regulation Centre of Excellence (ERCE)**, an organ of the **Energy Regulators Association of East Africa**. ERCE is an institution dedicated to promoting excellence in energy regulation across Africa, with a strong focus on capacity building, knowledge dissemination, and fostering sustainable energy solutions. ERCE offers training, certification, and technical assistance for professionals in the energy sector, particularly in the context of electricity market regulation, development, and management. The Centre's goal is to equip energy professionals with the skills and knowledge necessary to navigate the complexities of electricity markets and regulatory frameworks, both on a regional and continental scale.

4.1. Background of the Energy Regulation Centre of Excellence (ERCE)

The **Energy Regulation Centre of Excellence (ERCE)** was established to address the critical need for improved energy regulation and market development across Africa. As energy systems evolve, especially with the rise of renewable energy sources, decentralized grids, and regional market integration, the demand for qualified professionals capable of understanding and implementing effective regulatory and market strategies has grown. ERCE serves as a hub for the development of such expertise by providing comprehensive training and support to energy regulators, policymakers, utility companies, and market participants.

ERCE operates as a specialized training centre within the **Electricity Regulatory Authorities of Africa (EREA)**, which is an EastAfrican organization established to promote the development and harmonization of electricity markets and regulatory frameworks across the region and Continent. Through its partnership with regional electricity pools and global institutions, ERCE offers programs that empower individuals and organizations to adopt best practices in electricity market design, regulatory compliance, and efficient electricity trading.

4.2. Role of ERCE in Providing Advanced Electricity Market Courses

ERCE's advanced courses are uniquely positioned to support Africa's energy transition and the successful integration of regional markets. The training provided is designed not only to enhance technical and regulatory capabilities but also to address the challenges of managing power markets with a growing share of renewable energy, ensuring efficient cross-border trade, and fostering investment in energy infrastructure. The courses aim to prepare participants to effectively contribute to the development of **AfSEM**, the **Africa Single Electricity Market**, and to engage in regional electricity trade through Africa's power pools.

By providing these specialized courses, ERCE plays a pivotal role in strengthening regional power pools and advancing the operational efficiency of electricity markets. These training programs will directly support key energy organizations, including the **Eastern Africa Power Pool (EAPP)**, **Southern Africa Power Pool (SAPP)**, **Central African Power Pool (CAPP)**, **West African Power Pool (WAPP)**, and **North African Power Pool (COMELEC)**, all of which are instrumental in the development of regional electricity markets and the eventual realization of AfSEM.

5. Regional Power Pools in Africa

Africa's power pools are the backbone of regional electricity integration, fostering cross-border cooperation and energy trade to ensure energy security, affordability, and sustainability. These power pools play a critical role in the development of electricity markets, enabling the efficient utilization of resources across borders. Here is an overview of Africa's major power pools and their state of development:

5.1. Eastern Africa Power Pool (EAPP)

The Eastern Africa Power Pool (EAPP) is a regional organization formed to promote the integration of electricity markets across the Eastern Africa region. Established in 2005 under the African Union's energy development initiative, the EAPP's primary mission is to facilitate cooperation among member states in the development and sharing of electricity resources. It aims to create a regional electricity market that fosters economic growth, enhances energy security, and promotes sustainability by leveraging the region's diverse energy sources.

The EAPP covers countries in Eastern Africa, including Egypt, Sudan, Kenya, Uganda, Ethiopia, Rwanda, Tanzania, Burundi, and the Democratic Republic of Congo (DRC). These nations are rich in hydroelectric power, geothermal, wind, and solar energy potential, which are key resources that the EAPP strives to optimize through cross-border electricity trading. One of the most significant goals of the EAPP is to establish a single, integrated electricity market where energy flows seamlessly across borders. This would allow countries to access cheaper and more reliable electricity, reduce power shortages, and lower the cost of energy. The EAPP has been making steady progress towards the development of an interconnected power grid, which includes upgrading transmission infrastructure, enhancing regulatory frameworks, and harmonizing power trading policies. One of the critical components of the EAPP's strategy is the Market Operator (MO), a central entity tasked with managing the day-to-day functioning of the regional electricity market. The Market Operator will ensure efficient power dispatch, handle trading of electricity, facilitate grid balancing, and promote transparency in the pricing mechanisms. The establishment of the Market Operator is essential for the proper functioning of the EAPP, as it will provide the necessary infrastructure for real-time market operations and ensure that the regional electricity system operates smoothly.

As of now, the operationalization of the EAPP's Market Operator is still in progress. Several steps have been taken, including the development of legal, regulatory, and institutional frameworks that will support the MO's activities. This includes the drafting of a market protocol, the creation of a governance structure for the Market Operator, and the selection of the country responsible for hosting the MO. Moreover, technical tools such as market software and forecasting systems are being put in place to facilitate transparent market operations. However, challenges remain in fully operationalizing the Market Operator. These include varying levels of development and policy alignment among the member states, differing energy sector reforms, and the complex nature of coordinating cross-border power exchange. There is also the need to address infrastructure gaps and ensure reliable power transmission across the region, which can impact the efficiency

of market operations. Despite these challenges, significant strides have been made toward integrating the regional market. The EAPP has launched pilot trading schemes and is working on improving electricity exchange agreements among its member countries. In parallel, the design of the regional power market's architecture is being refined to ensure a more robust and sustainable framework. The completion of the Market Operator's operationalization is seen as a major milestone in achieving the EAPP's vision of an integrated, efficient, and sustainable electricity market in Eastern Africa.

5.2. Southern African Power Pool (SAPP)

The Southern African Power Pool (SAPP) is a regional electricity market established in 1995 to promote the integration of electricity networks and trading among Southern African countries. The SAPP's member countries include Angola, Botswana, Eswatini, Lesotho, Malawi, Mozambique, Namibia, South Africa, Zambia, and Zimbabwe. Its primary objective is to create an interconnected and efficient regional electricity market that facilitates cross-border power trading, enhances energy security, and promotes sustainable energy use in the region. The integration of national electricity grids into a regional network allows countries to share resources, reduce energy costs, and address power shortages.

A critical component of SAPP's vision is the establishment of a well-functioning market that supports efficient electricity trading. To achieve this, the SAPP operates a variety of market mechanisms, including the Day-Ahead Market (DAM), which is a central feature of its trading platform. The Day-Ahead Market is a financial market in which electricity transactions are made for delivery on the following day. Market participants submit their electricity demand and supply bids for each hour of the next day, and these are cleared to determine the market price for each hour of electricity delivery.

The Day-Ahead Market (DAM) in the Southern African Power Pool is a key step toward creating a more transparent and efficient regional electricity market. It allows market participants—such as utilities, independent power producers, and large consumers—to buy and sell electricity for the day ahead. This mechanism is vital for ensuring that electricity generation and consumption are balanced, as it enables efficient planning and dispatching of electricity resources.

As of now, the DAM has been operational in certain regions, with South Africa being the first country to establish its participation in the market. The South African electricity market operator, Eskom, plays a significant role in managing the Day-Ahead Market, as South Africa's electricity generation capacity is crucial to the overall functioning of the regional market. The DAM facilitates the trading of electricity between countries connected to the SAPP grid, enabling participants to schedule cross-border power exchanges and optimize the use of regional resources.

While the Day-Ahead Market has seen growth, challenges remain in fully integrating all SAPP member states into the market. Several countries are in different stages of readiness, with some yet to fully implement or participate in the DAM. These challenges include infrastructure gaps, varying regulatory environments, and the need for greater coordination among member countries to harmonize market rules and trading practices. Furthermore, the establishment of the Market Operator responsible for overseeing the DAM's operations is an ongoing process, with continued efforts to streamline operations and ensure efficiency.

In addition to the Day-Ahead Market, the Southern African Power Pool also offers several other market products designed to facilitate efficient electricity trading and provide flexibility in managing grid operations. These products include:

Balancing Market: This market is designed to manage real-time imbalances between electricity supply and demand. When actual generation or consumption deviates from forecasts, the Balancing Market ensures that power is available to correct these imbalances, preventing grid instability. It operates on a shorter time frame than the Day-Ahead Market and plays a crucial role in maintaining the reliability of the grid.

Intra-Day Market: The Intra-Day Market allows market participants to make adjustments to their positions closer to the time of delivery, typically on the same day as the scheduled delivery. It enables participants to react to changes in demand, generation conditions, or unforeseen events that affect the system.

Forward Market: This product allows participants to contract electricity for future delivery periods, helping them manage price risks and plan their energy needs over a longer horizon. Forward contracts help stabilize prices by providing a mechanism for hedging against price volatility in the spot markets.

Capacity Market: This product provides financial incentives for market participants to maintain or build generation capacity, ensuring that there is adequate reserve power available to meet demand during peak periods. The capacity market helps address long-term power reliability issues by securing future capacity needs.

The Southern African Power Pool (SAPP) has made significant strides in developing a regional electricity market that promotes cross-border energy trading and efficiency. The Day-Ahead Market (DAM), as the central trading platform, plays a vital role in ensuring balanced electricity supply and demand on a daily basis. While the DAM is operational in certain regions, full integration of all member states is an ongoing process that requires overcoming challenges related to infrastructure, regulatory alignment, and coordination. Additionally, other market products, such as the Balancing Market, Intra-Day Market, Forward Market, and Capacity Market, complement the Day-Ahead Market by enhancing flexibility, reliability, and long-term planning in the region's electricity system. The successful development and operationalization of these market mechanisms are essential for creating an efficient, transparent, and sustainable electricity market in Southern Africa.

5.3. Central African Power Pool (CAPP)

The Central African Power Pool (CAPP) is a regional electricity cooperation initiative aimed at enhancing energy integration and promoting cross-border electricity trade among Central African countries. Established in 2003, CAPP seeks to integrate the power grids of member countries, which include Cameroon, the Central African Republic, Chad, the Republic of Congo, Gabon, Equatorial Guinea, and the Democratic Republic of Congo (DRC). This regional initiative is part of the broader African Union strategy to promote energy security, economic development, and the sustainable use of energy resources across the continent.

The primary objective of CAPP is to foster cooperation among its member states to develop a unified and reliable electricity market that facilitates the sharing of energy resources, improves electricity access, and supports regional economic growth. Central Africa is rich in hydropower potential, especially with the Congo River Basin, and CAPP's efforts focus on leveraging this abundant resource for the benefit of its members.

The integration of power systems in the region allows countries to complement each other's energy needs, ensuring a stable electricity supply even during periods of regional shortages or peak demand.

The operationalization of CAPP has been progressing, albeit slowly, due to several challenges that the region faces. These challenges include political instability, underdeveloped infrastructure, and financial constraints, which have impeded the smooth implementation of cross-border electricity trade. However, CAPP has made significant strides toward its goal of creating an integrated regional electricity market.

1. *Transmission Infrastructure:* CAPP has made notable progress in developing the necessary transmission infrastructure to interconnect the member countries' power grids. Several high-voltage transmission lines have been constructed or upgraded to enable the exchange of electricity between countries. However, there are still gaps in the regional grid, and many areas require significant investment in both transmission and distribution systems to ensure reliable cross-border electricity flows.

2. *Legal and Regulatory Framework:* One of CAPP's key initiatives has been the development of a harmonized legal and regulatory framework to facilitate cross-border electricity trading. This includes agreements on power purchase and sale, grid access, tariff structures, and dispute resolution mechanisms. The creation of a unified regulatory framework is essential for ensuring transparency and creating a stable environment for investors and market participants.

3. *Market Design and Governance:* CAPP is working on designing a regional electricity market that includes a market operator responsible for managing day-to-day market operations, electricity trading, and ensuring grid stability. The establishment of this market operator is critical for the effective functioning of the CAPP market. Currently, CAPP has been laying the groundwork for the market's governance structure, but full implementation remains in progress.

4. *Investment and Financing:* Securing adequate financing for infrastructure projects remains a significant challenge for CAPP. Many member countries face economic constraints, and large-scale investments are necessary to complete transmission infrastructure and other energy projects. While CAPP has attracted some international funding and support from multilateral institutions such as the World Bank, additional financial resources are needed to ensure the full operationalization of the regional market.

5. *Coordination and Political Will:* Given the political and economic differences among member states, achieving full coordination and alignment in policies remains a challenge. Political will is crucial for overcoming barriers such as national energy policies, tariff disparities, and differing levels of commitment to regional integration. However, CAPP has been actively working to promote dialogue and foster cooperation among its member states to ensure long-term sustainability.

The Central African Power Pool (CAPP) represents an important step toward regional energy integration in Central Africa. While significant progress has been made in terms of transmission infrastructure, regulatory frameworks, and market design, the operationalization of CAPP faces challenges related to financing, political stability, and infrastructure gaps. The successful development of a regional electricity market will require continued collaboration among member states, robust investment in infrastructure, and effective

governance structures. Once fully operational, CAPP will play a vital role in enhancing energy security, supporting economic development, and improving electricity access across Central Africa, making it an essential component of the region's future energy landscape.

5.4. West African Power Pool (WAPP)

The West African Power Pool (WAPP) is a regional initiative established in 2000 to promote the integration of electricity markets across West Africa. The WAPP aims to enhance energy security, increase access to affordable electricity, and improve the reliability of power supply by creating an interconnected regional electricity grid. The pool includes member countries from the Economic Community of West African States (ECOWAS), such as Benin, Burkina Faso, Côte d'Ivoire, Ghana, Guinea, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, and Togo.

The primary objective of WAPP is to facilitate the sharing of electricity resources among these countries, enabling them to balance supply and demand more efficiently. This collaboration helps to address issues like electricity shortages, high energy costs, and the need for a more sustainable energy mix. West Africa is rich in diverse energy sources, including hydropower, thermal, solar, and natural gas, which the WAPP aims to optimize through regional cooperation.

The operationalization of the West African Power Pool has progressed over the years, though challenges remain. Key achievements and ongoing efforts include:

1. *Transmission Infrastructure Development:* One of the key goals of WAPP is to establish a robust transmission network that links the power grids of member countries. Significant progress has been made in constructing and upgrading transmission lines that connect various countries in the region. This allows for cross-border electricity exchanges, which are essential for balancing supply and demand across the region. However, several infrastructure gaps still exist, particularly in remote areas, and additional investment is needed to complete the interconnected grid.

2. *Market Design and Governance:* The design of a regional electricity market is a critical part of WAPP's operationalization. The market is intended to enable efficient trading of electricity among member states, ensuring fair pricing, reliability, and transparent operations. A central feature of this market is the Market Operator, which is responsible for overseeing market operations, balancing the grid, and ensuring that transactions are conducted efficiently. The establishment of a Market Operator is underway, and WAPP has developed a governance structure to manage market operations. However, achieving full market functionality and integrating all member states into the market remains a work in progress.

3. *Regulatory and Legal Framework:* WAPP has worked on harmonizing national regulatory frameworks to facilitate cross-border electricity trade. This includes creating standardized electricity tariffs, power purchase agreements, and dispute resolution mechanisms. Regulatory alignment among member states is essential for smooth market operations, but political and economic differences across the region pose challenges to full legal harmonization.

4. *Power Generation Projects and Resource Sharing:* WAPP encourages joint power generation projects to meet the growing energy demand in the region. This includes large-scale hydropower plants, natural gas plants, and renewable energy projects. One of the most significant ongoing initiatives is the ^{**}Bumbuna

Hydroelectric Project** in Sierra Leone and the **West African Gas Pipeline** project, which aims to provide reliable energy from natural gas sources. WAPP also facilitates the sharing of electricity resources, allowing countries with surplus energy to export power to those facing deficits.

5. Financial Challenges and Investment: Securing financing for energy projects remains a major hurdle for WAPP. Despite support from international organizations such as the World Bank, the African Development Bank (AfDB), and the European Union, member states face financial constraints that limit the pace of infrastructure development and market integration. Continued investment is critical to overcoming these barriers and achieving the full operationalization of WAPP.

6. Political Will and Cooperation: The successful operationalization of WAPP requires strong political commitment from member states. While cooperation has improved over time, political and regulatory differences across countries can delay progress. The harmonization of national policies and the willingness to make collective decisions are crucial for the success of the initiative.

The West African Power Pool (WAPP) plays a crucial role in the integration of the energy markets in West Africa. It aims to provide reliable, affordable, and sustainable electricity to the region by leveraging shared resources and improving infrastructure. While significant progress has been made in terms of transmission network development, market design, and regulatory frameworks, challenges such as infrastructure gaps, financial constraints, and political coordination continue to slow full operationalization. The successful establishment of a functional electricity market and interconnected grid will require continued collaboration, investment, and political commitment. Once fully operational, WAPP has the potential to enhance regional energy security, reduce electricity costs, and promote economic growth in West Africa.

5.5. North African Power Pool (COMELEC)

The North African Power Pool (COMELEC) is a regional electricity cooperation initiative aimed at integrating the electricity systems of North African countries. Established under the umbrella of the Arab Maghreb Union (UMA) in 1997, COMELEC includes member countries such as Algeria, Egypt, Libya, Morocco, Sudan, and Tunisia. The pool's core objective is to create a unified electricity market that allows for efficient cross-border electricity trade, enhances regional energy security, and ensures the reliable and sustainable supply of electricity across North Africa.

North Africa is home to diverse energy resources, including significant reserves of natural gas, solar, wind, and hydropower potential. By coordinating electricity generation, transmission, and distribution, COMELEC aims to optimize the use of these resources, reduce energy costs, and address supply challenges, particularly during peak demand periods. The regional integration of power systems offers the opportunity to balance supply and demand, improve grid stability, and increase access to energy.

The operationalization of COMELEC has progressed over the years, with several key achievements and ongoing efforts in place to create an integrated regional electricity market. While COMELEC has faced challenges, including political instability and infrastructure limitations, the pool is steadily working toward realizing its goals:

1. Transmission Infrastructure: A significant aspect of COMELEC's operationalization is the development of a regional transmission network that links member countries' power grids. Several cross-border

transmission lines have been established, facilitating the exchange of electricity between countries. These lines allow countries to import and export electricity, which helps optimize generation resources and maintain grid stability. However, additional investments in transmission infrastructure are needed to close gaps and ensure that all member states are fully integrated into the network.

2. Market Design and Integration: COMELEC's market design focuses on creating a competitive, transparent electricity market that allows for efficient electricity trading. The establishment of a Market Operator is a crucial step in ensuring that electricity trading, grid balancing, and pricing are effectively managed across the region. While COMELEC has made strides in market design, challenges remain in fully implementing the market, including harmonizing the regulatory and tariff structures across member countries. The market operator's role will be central in facilitating smooth operations and providing transparency in market transactions.

3. Regulatory and Legal Framework: COMELEC has worked on harmonizing legal and regulatory frameworks to facilitate cross-border electricity trade. This includes the standardization of power purchase agreements, grid access rules, and dispute resolution mechanisms. The successful operationalization of the regional market depends on regulatory alignment and the willingness of member countries to adopt common policies and tariff structures. While progress has been made in this area, political and economic differences between member states present ongoing challenges in achieving full regulatory coherence.

4. Energy Resource Sharing and Projects: COMELEC encourages the development of joint energy projects, particularly those that leverage North Africa's renewable energy potential. Projects such as large-scale solar power plants and the development of a regional gas pipeline network have the potential to provide affordable and sustainable electricity to the region. Morocco, for instance, has invested heavily in solar energy and is positioned as a regional leader in renewable energy, which could support energy security across the pool. Despite these efforts, scaling up such projects requires significant investment and coordination among member states.

5. Financial and Political Challenges: Like many regional initiatives in Africa, COMELEC faces financial constraints that limit the pace of infrastructure development and market integration. While there has been support from international donors and financial institutions, ongoing economic challenges in some member countries, particularly Libya and Sudan, have slowed the pace of progress. Moreover, political instability in certain regions adds complexity to the decision-making process and to the implementation of regional agreements.

The North African Power Pool (COMELEC) is an ambitious initiative that aims to integrate the electricity markets of North Africa, optimize energy resources, and enhance regional energy security. While the operationalization of COMELEC has made progress in terms of infrastructure development, market design, and regulatory alignment, challenges such as financing, political instability, and infrastructure gaps remain. The full operationalization of the regional electricity market depends on continued cooperation among member states, significant investment in transmission networks, and the establishment of a functional market operator. Once fully realized, COMELEC has the potential to transform North Africa's energy landscape, reduce electricity costs, enhance grid reliability, and contribute to the region's sustainable economic development.

5.6. The Future of AfSEM

The **Africa Single Electricity Market (AfSEM)** is a transformative initiative under the African Union, aimed at creating the largest interconnected electricity market in the world. By harmonizing regulations, promoting cross-border electricity trade, and leveraging renewable resources, AfSEM will enable affordable and sustainable energy access for all Africans.

- **Key Features of AfSEM:**

- Harmonized regulatory frameworks to unify Africa's diverse electricity markets.
- Development of competitive electricity markets to foster efficiency and innovation.
- Integration of renewable energy to support Africa's sustainable development goals.
- Strengthening of interregional interconnections to enhance energy security.

- **Vision for the Future:**

AfSEM envisions a fully integrated, competitive, and sustainable electricity market that positions Africa as a global energy leader. The implementation of AfSEM will complement and enhance the efforts of power pools, bridging gaps in energy access and ensuring a robust framework for regional and continental electricity trade.

6. Relevance of the Courses

These courses are uniquely aligned with the challenges and opportunities presented by Africa's power pools and AfSEM. Participants will gain practical skills and advanced knowledge to address infrastructure, market design, regulation, and system operation challenges. They will also explore strategies for leveraging the vast potential of renewable energy, digital technologies, and market coupling to create a resilient and sustainable electricity market.

By focusing on global best practices and the unique African context, the courses empower professionals to contribute to the realization of AfSEM and the successful evolution of Africa's electricity markets.

The Seven(7) key course are as follows:

1. Understanding Electricity Transmission pricing(ETP)
2. Electricity Market Integrity,Regulation and Surveillance(EMIRS)
3. Regional Electricity Trading (RET) and market designs
4. Regional Electricity Traders Certification program(RETc)
5. Regional Electricity markets trading seminar (RETS)
6. Understanding Regional Electricity Markets & Market Rules(REM)
7. Regional Electricity System Operations and Coupling(RESOC)

7. The Schedule of Courses and timelines

Course Title	Objective	Course Content	Level/Target groups	Training Schedule (2025)
1. Understanding Electricity Transmission Pricing (ETP)	To introduce the principles of electricity transmission pricing and cost allocation.	<p>Week 1: Overview of transmission systems:</p> <ul style="list-style-type: none"> - Key components and functions of transmission networks. - Cost allocation and pricing methodologies (postage stamp, nodal pricing). - Introduction to congestion management strategies. <p>Week 2: Advanced pricing techniques:</p> <ul style="list-style-type: none"> - Shadow pricing and its role in optimal dispatch. - Investment cost recovery in liberalized markets. - Impact of transmission losses on pricing and their mitigation. <p><i>Strategic infrastructure development:</i></p> <ul style="list-style-type: none"> - Case studies of grid modernization and expansion planning. 	Basic/Pools, Ministries, Utilities, regulators, Planning committee	February 17 - February 28
2. Electricity Market Integrity, Regulation, and Surveillance (EMIRS)	To analyse the principles of market integrity and regulation to ensure fair and efficient operations.	<p>Week 1: Principles of market integrity:</p> <ul style="list-style-type: none"> - Types of market manipulation (price, volume, etc.). 	Medium/ Pools, Ministries, Utilities, regulators, Planning	March 17 - March 28

		<ul style="list-style-type: none"> - Ensuring fairness in competitive electricity markets. <p>Week 2: Regulatory frameworks:</p> <ul style="list-style-type: none"> - Key global policies (e.g., EU REMIT, US FERC guidelines). - Monitoring cross-border electricity trading. <p><i>Surveillance strategies:</i></p> <ul style="list-style-type: none"> - Advanced data analytics in market surveillance. - Managing disputes in energy markets. - Role of independent market monitors in global electricity markets. 	committee, operations committee	
3. Regional Electricity Trading (RET) and Market Designs	To explore trading mechanisms and designs in regional electricity markets.	<p>Week 1: Basics of trading mechanisms:</p> <ul style="list-style-type: none"> - Pool vs. bilateral markets. - Day-ahead, real-time, and balancing markets. <p>Week 2: Regional integration:</p> <ul style="list-style-type: none"> - Cross-border trade agreements. - Transmission capacity allocation (explicit vs. implicit). <p><i>Market design innovations:</i></p> <ul style="list-style-type: none"> - Flexibility markets for renewable integration. - Zonal vs. nodal pricing for regional efficiency. 	Medium/ Pools, Ministries, Utilities, regulators, Power Market committees, Steering committees, Planning committee, operations committee	April 14 - April 25

		<ul style="list-style-type: none"> - Impacts of carbon pricing on electricity trading. - Case studies: Nord Pool, SAPP, MISO, and CAMMESA market designs. 		
4. Regional Electricity Traders Certification Program (RETC)	To prepare participants for professional trading in regional electricity markets.	<p>Week 1: Role of traders:</p> <ul style="list-style-type: none"> - Fundamentals of bidding, hedging, and arbitrage. - Interaction with transmission operators. <p>Week 2: Advanced trading tools:</p> <ul style="list-style-type: none"> - Algorithmic trading in electricity markets. - Incorporating renewable forecasts in trading strategies. <p><i>Specialized strategies:</i></p> <ul style="list-style-type: none"> - Options trading and risk hedging. - Managing portfolio volatility with predictive analytics. - Case studies on electricity trading success in global regions. - Certification exam preparation and practice simulations. 	Advanced/ Pools, Ministries, Utilities, regulators, Power Market committees, Steering committees, traders, Planning committee, operations committee	May 12 - May 23
5. Regional Electricity Markets Trading Seminar (RETS)	To provide hands-on training on trading strategies and market operations.	<p>Week 1: Simulation basics:</p> <ul style="list-style-type: none"> - Introduction to trading software and interfaces. - Setting up mock day-ahead and intraday trades. 	Advanced/ Pools, Ministries, Utilities, regulators, Power Market committees, Steering committees, traders,	June 9 - June 20

		<p>Week 2: Advanced simulations:</p> <ul style="list-style-type: none"> - Stress testing under extreme market conditions. - Incorporating DERs and virtual power plants (VPPs) into trading portfolios. <p><i>Risk and compliance training:</i></p> <ul style="list-style-type: none"> - Addressing non-compliance and unethical trading. - Collaborative exercises simulating multi-region energy crises and market restoration strategies. 	Planning committee, operations committee, Finance	
6. Understanding Regional Electricity Markets & Market Rules (REM)	To provide an in-depth understanding of market structures, rules, and regional interconnections.	<p>Week 1: Market fundamentals:</p> <ul style="list-style-type: none"> - Liberalization and unbundling of electricity sectors. - Role of ISOs and TSOs. <p>Week 2: Market rules and policies:</p> <ul style="list-style-type: none"> - Governance structures for regional integration. - Rule harmonization for cross-border trading. <p><i>Specialized topics:</i></p> <ul style="list-style-type: none"> - Design of ancillary service markets. - Coordination of balancing markets. 	Advanced/ Pools, Ministries, Utilities, regulators, Power Market committees, Steering committees, traders, Planning committee, operations committee,	July 14 - July 25

		- Market compliance frameworks (Europe's Network Codes, USA's FERC policies).		
7. Regional Electricity System Operations and Coupling (RESOC)	To explore system operations and market coupling for efficient regional trading.	<p>Week 1: <i>Basics of system operations:</i></p> <ul style="list-style-type: none"> - Load dispatch and demand response mechanisms. - Congestion management techniques. <p>Week 2: <i>Market coupling principles:</i></p> <ul style="list-style-type: none"> - Day-ahead and intraday coupling mechanisms. - Case studies on flow-based market coupling (Europe) and its alternatives. <p><i>Advanced coupling scenarios:</i></p> <ul style="list-style-type: none"> - Role of energy storage and hybrid grids (AC/DC) in market operations. - Transition to integrated renewable grid systems across regional boundaries. 	Advanced/ Pools, Ministries, Utilities, regulators, Power Market committees, Steering committees and traders, Planning committee, operations committee	August 11 - August 22

8. Conclusion

The Advanced Electricity Market Courses provided by the Energy Regulation Centre of Excellence (ERCE) are pivotal in shaping the future of Africa's energy landscape. As the continent navigates the complexities of regional power pools and the ambitious goal of establishing the Africa Single Electricity Market (AfSEM), these courses serve as a critical enabler in equipping professionals with the advanced knowledge and expertise necessary to master the intricacies of electricity market operations, regulation, and integration.

ERCE's commitment to capacity building and fostering sustainable energy solutions is evident in its meticulously designed curriculum, which blends rigorous theoretical frameworks with practical, real-world applications. By offering specialized training in key areas such as transmission pricing, market integrity, regional trading dynamics, and system operations, ERCE ensures that participants are not only well-versed in contemporary market mechanisms but are also prepared to confront the challenges of a rapidly evolving sector.

These courses are strategically aligned with Africa's overarching energy objectives, particularly the drive toward energy sustainability through enhanced regional integration and the optimal utilization of renewable energy resources. As Africa's power pools, such as the Eastern Africa Power Pool (EAPP) and the Southern Africa Power Pool (SAPP), continue to mature, these training programs will prove indispensable in strengthening interregional connectivity, streamlining electricity trading, and facilitating the seamless integration of markets under AfSEM.

In conclusion, ERCE's advanced electricity market courses are instrumental in advancing the professional capacity of individuals across Africa, empowering them to address the continent's escalating energy demands, stimulate economic growth, and contribute to the realization of a sustainable, interconnected, and resilient electricity market. By equipping participants with the tools to navigate the complexities of modern energy markets, ERCE plays a key role in shaping Africa's energy future and solidifying the continent's position as a global leader in sustainable energy development.



Venue:

The Courses will be offered in **Harare-Zimbabwe**.

Cost:

The cost of each course is **USD\$2500**

Other requirements:

Carry your laptop.

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For details of other, course dates and registration, please visit our website: <https://erce.energyregulators.org/>

NB: To express your interest in these tailor-made courses, please contact us via the email address below by **February 14th, 2025**. Institutions are kindly requested to specify the number of participants. The primary language of instruction will be English; however, French translation will be available upon request.

Dr. Geoffrey Aori Mabea

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