African School of Regulation

Electricity Markets: Design, Architecture & Regulation

Call for Applications

Course Director:
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Duration & Course Dates
In-person learning: five days, Monday to Friday
1-5 March 2027

Location
Cotonou, Benin.

Format
An intensive residential programme combining expert sessions, debates, African case studies, peer exchange, a live electricity market simulation and Site visit to engage professionals on ground.

Language
English and French, with all materials available in both languages.

Target Audience
Electricity regulators, utility professionals, system and market operators, energy ministry officials, regional institutions, consultants, DFIs and researchers.

Registration closes
22 February 2027

One week in-person Course

Wholesale electricity markets in African countries.

From national, regional and continental perspectives.

Introduction.

Electricity markets are not an end in themselves. They are institutional and regulatory arrangements designed to improve the efficiency of power system operation, mobilise investment, allocate risks transparently, and provide credible price signals for generation, transmission, flexibility, and demand-side resources. Unlike markets for ordinary commodities, electricity markets must operate within the physical constraints of a network in which supply and demand must be balanced continuously, transmission limits matter, system security is paramount, and failures can have immediate economic and social consequences.

Most African electricity systems do not yet satisfy the minimum conditions required for robust national competitive wholesale markets. Many remain characterised by small system size, limited reserve margins, weak or financially distressed utilities, insufficient metering and settlement systems, dominant incumbent generators or single buyers, constrained transmission networks, weak creditworthiness, and limited experience with independent system operation and market monitoring. In such conditions, importing sophisticated market models from Europe, North America, or other mature power systems is not advisable. Premature liberalisation may increase transaction complexity without improving dispatch efficiency, may undermine the financial viability of existing utilities, may shift risks to parties unable to manage them, and may create opportunities for discrimination, gaming, or politically driven exceptions.

For these reasons, electricity markets cannot simply be “introduced” by allowing generators and customers to trade freely. They must be carefully designed, sequenced, regulated, monitored, and adapted to the actual conditions of each power system.

A central message of this course is therefore that market reform must begin with power-system fundamentals. Before competition can be meaningful, there must be an adequate power sector structure, enforceable contracts, sound dispatch rules, non-discriminatory transmission access, financially viable offtakers, and institutions capable of adapting and enforcing rules. In many countries, the first priority is not to create a short-term market with hourly or sub-hourly time intervals, but to improve regulated procurement of new power plants, strengthen central dispatch, clarify the role of the system and market operator, establish transparent settlement procedures, and develop bankable contractual frameworks that are compatible with least-cost system operation.

The African context makes regional electricity markets especially important. Many national systems are too small, too concentrated, or too resource-constrained to sustain effective competition on their own. Regional power pools can enlarge the market, diversify resources,

reduce reserve requirements, improve the use of hydropower, gas, solar, wind, and storage across wider geographic areas, and create more credible opportunities for trade. SAPP and WAPP, and progressively EAPP, CAPP and COMELEC, are therefore not peripheral to African market reform; they are among its most practical foundations. Regional markets can allow African countries to capture the benefits of competition and coordination gradually, while national systems continue to strengthen their own institutions, networks, utilities, and regulatory frameworks. They are also a necessary stepping stone toward the African Single Electricity Market.

Regional trade should not be confused with a mere multiplication of physical bilateral contracts. Bilateral contracts will remain essential in Africa, especially to support investment and allocate risks between generators, utilities, traders, and large customers. But if these contracts are treated as physical rights to self-dispatch or to move electricity across the network independently of system conditions, they can fragment system operation, reduce dispatch efficiency, complicate congestion management, weaken the role of the system operator, and leave imbalances, losses, ancillary services, and residual system costs to be settled through ad hoc arrangements. A better approach is to distinguish clearly between commercial contracting and physical operation: long-term contracts can provide financial hedging and investment certainty, while dispatch, balancing, congestion management, and short-term exchanges should remain coordinated through transparent system and market rules.

This course is designed around that practical challenge. It starts from the basics of electricity system economics and market architecture, because many African professionals are engaging with market concepts in systems where fully competitive markets do not yet exist. But it also goes in depth: it examines the design of trading arrangements, dispatch, pricing, settlement, transmission access, market governance, regional power pools, private participation in transmission, and the implications of renewable energy and flexibility. The aim is not to promote a single market model, but to equip regulators, policy makers, utilities, system operators, regional institutions, and sector professionals with the analytical tools needed to judge which market arrangements are appropriate, which preconditions are missing, which transitional steps are credible, and which reforms may be risky or counterproductive.

The course therefore treats electricity markets as a matter of institutional design, not ideology. Competition can be valuable, but only when embedded in a technically sound, financially viable, and well-regulated power system with an adequate structure. For many African countries, the credible path will be gradual: strengthening national sector fundamentals, improving regulated and competitive procurement, separating commercial contracts from physical dispatch, building transparent settlement systems, expanding regional trade, and progressively developing organised regional market platforms. This is the perspective from which the course approaches electricity market design, architecture, and regulation.

This course is designed to equip regulators, utility professionals, and policy practitioners and researchers with the conceptual foundations and practical skills required to design, manage, operate, oversee, evaluate and reform electricity markets in national and regional contexts.

The course trains in relevant global best practices while keeping the focus on the African national and regional contexts. The course includes direct engagement and interaction with experts through a structured site visit. In collaboration with the Standford University, the course will deliver a gamified learning using a live electricity market simulation game where participants act as traders, regulators and utilities, to experience market dynamics in real time.

Objectives.

Starting from the history and the fundamentals of electricity markets, the course will cover the relevant topics necessary to understand the factors affecting the decision to establish electricity markets in various African countries and the most adequate market designs, as well as the convenience to integrate national markets into regional and even continental market structures and how to implement these multinational markets.

All relevant topics will be covered in depth at national and regional levels, including governance; minimum requirements to establish national wholesale electricity markets; measures to mitigate and monitor the exercise of market power; efficient utilisation of generation resources; integration of variable renewables; design options when establishing short, medium and long-term markets; energy price formation; comparative analysis of the major types of contracts; the competitive or mandatory provision of ancillary services, such as operating reserves, voltage control or black-start capability; coping with the regulatory and operational complexities introduced by the transmission network, including the allocation of transmission costs and losses; and the typical structure and content of a grid code.

The description and discussion of practical experiences in the design and the analysis of the performance of actual national and regional electricity markets will be included in each module. At the end of the course the participants will be able to evaluate and discuss the recent power sector reforms in various African countries, which try to liberalise bilateral power trade for large generators and those consumers declared as eligible to take part.

The course participants will have the opportunity of interacting with professionals presently dealing with these topics in their organisations.

Organisation.

Format.

This course is delivered as an intensive, five-day (Monday to Friday) in-person residential program designed to acquire understanding of the fundamentals and implementation of electricity markets in the context of African countries and the existing regional markets in different levels of development. Networking with instructors and course participants is a key component of the course. The course will make use of a variety of formats mixing conceptual formal presentations with open discussions on practical case studies, including:

- Expert-led interactive sessions and facilitated debates.
- Peer-to-peer knowledge exchanges.

- Case studies: In-depth analyses, tailored specifically to the African electricity landscape.
- Gamified learning using a live electricity market simulation game where participants act as traders, regulators and utilities, to experience market dynamics in real time.
- Site visit to engage with industry professionals.

Venue.

Cotonou, Benin.

Language.

The official course languages are English and French. All course materials, presentations, exercises, readings, and case studies will be made available in both languages.

Target Audience

This course is designed for:

- Commissioners and senior technical staff of national electricity regulatory commissions in ECOWAS member states and comparable emerging markets.
- Economic and technical specialists in regulatory bodies responsible for market oversight, market monitoring, or competitive market development.
- Engineers, economists, and financial analysts in power utilities, transmission companies, and distribution entities engaged in market operations or reform.
- Policy and planning officials at energy ministries responsible for electricity market reform, regional integration policy, or investment framework design.
- Technical staff at regional institutions, including the ECOWAS Regional Electricity Regulatory Authority (ERERA), Regional Energy Regulators Association (RERA), WAPP/SAPP/EAPP secretariats, and the ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE), and comparable bodies.
- Consultants and development finance institution (DFI) specialists and academics advising on electricity market design, power sector reform, or regional energy integration in West Africa and comparable markets.
- Other energy professionals interested in an intensive learning experience on the challenges and opportunities of establishing wholesale electricity markets at all levels of integration in the African continent.

Course content.

Structure.

The programme comprises nine modules delivered in five days. Each module is designed to build sequentially on prior content, integrating theory with applied regulatory practice.

***Module 1**: Foundations of Electricity Markets.*

The history of electricity markets. Early markets and the liberalising reform of the 1990s. Motivation to introduce markets. National energy policy and power sector regulation. The two major regulatory approaches: centralised versus market-based decision making of capacity expansion and management of generation and demand resources. Regulatory characterisation of the various activities in the electricity supply value chain. Main steps in

the liberalisation of the power sector: unbundling (accounting, functional, legal or ownership separation), restructuring, privatisation, liberalisation of generation and retail, and transition measures like vesting contracts.

***Module 2**: Power Sector Reform in African countries.*

Characterisation of the "standard liberalisation model". Partial implementations in African countries, departing from the standard model with adaptations to the specific countries' conditions. Single buyer model with or without independent power production. The performance of national utilities and the analysis of the factors impacting performance. Minimum requirements to establish wholesale electricity markets. Concessions in generation, transmission and distribution. Retail markets: experiences and the debate about their convenience.

***Module 3**: Business models of wholesale markets and centralised decision-making.*

Conceptual mathematical formulation supporting the evaluation of the essential features of wholesale markets and the similarities and differences with centralised management of generation to meet existing demand. Short-term marginal market price and short-term marginal production cost of electricity. Generation capacity adequacy. Justification of the need for capacity remuneration mechanisms (CRMs). Justification and computation of capacity payments. Other CRMs and existing experiences of their utilisation. Justification of other services beyond energy – frequency and voltage control, operating reserves, black-start capability – and how to value their price or cost.

***Module 4**: Trading arrangements and provision of necessary electricity services.*

Contracts and procurement. Different formats of electricity trading. More frequent types of contracts and their justification. Physical bilateral contracts (PBCs). Financial bilateral contracts (FBCs). Turning PBCs into FBCs and how to deal with security of supply. Independent power producers (IPPs) and power purchase agreements (PPAs). Market power in wholesale electricity markets: how to quantify it and what measures can be adopted to mitigate it. The market reference price. Settlement procedures. Contractual risk allocation and payment security. The need for ancillary services and the specification and provision method for each one. The functions of the System Operator.

A competitive market game will start with teams formed by course participants. The game will continue each day until the end of the course.

***Module 5**: Adding transmission: investment, access and cost allocation.*

Responsibility for transmission capacity expansion. The roles of any specialised planning agency, the system operator, the regulator and the government. The impact of the transmission network: losses and technical constraints. The reference level of spatial and temporal granularity in transmission prices. The debate about nodal, zonal and uniform prices. The reference "optimal least-cost security-constraint dispatch of generation and demand", with nodal prices and implicit consideration of losses and congestions. Simplifications to the reference approach that have been adopted. Transmission rights and how to obtain them. The use of loss factors. Methods to allocate transmission costs and to apply transmission charges. The principles of transmission cost allocation and how they are

implemented or ignored in actual implementations. The convenience of locational transmission charges, versus the alternative of nodal or even uniform charges.

***Module 6**: Market rules design and implementation. Market governance.*

Standard features of electricity markets – short, medium and long term. Hybrid markets with centralised buyer and independent power producers. The sequence of markets from short-term balancing to multiyear contracts. Trading platforms and the various formats of bidding in short-term markets. The processes through which electricity is bought and sold. Market clearing. Guarantees and other requirements to participate. Different models or market organisation. Eligibility of customers. The dilemma of allowing physical bilateral contracts. Regulatory interventions to procure security and flexibility, promote storage, facilitate renewable integration and deliver adequate investment. Debate on the most appropriate models for representative African countries. Markets rule design, governance and supervision. Enforcement, sanctions and dispute resolution. How to guarantee the independence of the System Operator. Settlement risks, payment discipline and dispute management.

***Module 7**: Cross-border electricity trade and regional power markets in Africa.*

The origin and justification for regional electricity markets. Power pools in Africa: governance, main design features, current state of development, plans for improvement or to complete the foreseen implementation – SAPP, WAPP, EAPP, CAPP and COMELEC. Similarities and differences with other power pools in the world. Lessons to be learned: design shortcomings and best practices. Setting ambitious but realistic goals for the African power pools. Necessary enhancements to national market and transmission regulation to cope with regional power trade: governance: ultimate decision making in market design, capacity expansion planning and market rules modification. Requirements to be a regional market participant, market rules, trade platform, regional market reference price, capacity expansion planning of generation and transmission, transmission cost allocation, priority in generation dispatch, congestion management at regional level, types of contracts and settlement. Minimum required levels of regulatory harmonisation. Payment security, utility creditworthiness and country risk. Security of supply from a regional perspective. Critical evaluation of the present performance and rate of progress of the African power pools. The path towards a continental electricity market (AfSEM).

***Module 8**: Private sector participation in transmission.*

The current lack of private sector investment in the meshed transmission network – i.e., beyond the lines dedicated to individual customers. Reasons for the current situation and potential approaches to attract private investment. Pros and cons of private sector ownership of transmission infrastructure. Description and evaluation of various business models of private sector ownership of transmission assets: whole-of-grid concessions, privatisation, merchant lines, industrial demand-driven models and independent transmission (ITP) projects. Suitability of these business models for African countries. In-depth analysis of the Independent Transmission Project (ITP) approach: enabling environment; auction design; environmental and land permits; project development, construction and operation; stakeholders; financing structure; contractual structure; risk allocation matrix; regulatory

approaches to reduce credit risk; dealing with foreign risk. Extending the ITP approach for cross-border transmission assets. International experiences and their suitability for adoption in African countries.

***Module 9**: Debate on the current regulatory reforms to introduce competition in African countries.*

In the last few years, several African countries – including Kenya, South Africa, Zambia, Namibia, Ghana, Nigeria and Mozambique – have modified their regulations, which now may allow large producers and consumers to contract bilaterally, while using the existing transmission/distribution grid against regulated network charges. Where these transactions are allowed, relevant questions must be answered: who qualifies as an eligible buyer or seller; whether network access is genuinely non-discriminatory; how wheeling charges and losses are calculated; who balances deviations and pays imbalance costs; how legacy PPAs and cross-subsidies are recovered; whether the system operator is neutral; and whether the incumbent utility is compensated, restructured, or simply exposed to bypass. This emerging African reform can be considered as "contractual liberalisation before, or instead of, market liberalisation." This last session of the course will be devoted to the comparison of the various approaches, either already implemented or being considered, their suitability depending on the national power system conditions and their impact on the development of the respective regional markets and, eventually, of the AfSEM.

Site Visit.

One structured site visit is included in the programme. The visit will be prepared in advance with briefing materials and targeted pre-visit reading and will be followed by debriefing session to integrate the experience of the site visit into the mainstream training of the course.

Instructors.

The programme is delivered by a group of experienced instructors from Africa and Europe comprising experienced former regulators, as well as energy professionals and academics who have designed or managed electricity markets. This blend of expertise ensures a balance between familiarity with global best practice and implementation-focused knowledge grounded in the realities of African power systems.

Drawing on the African School of Regulation's experience in training energy professionals across more than 20 African countries, the course offers a unique platform for peer learning and cross-country knowledge exchange within Africa. Participants will leave the programme with enhanced technical competencies and a strengthened network of regional counterparts, an enduring professional resource.

Evaluation Policy.

Participants are expected to engage fully in all training activities. This includes attendance in all sessions, active participation in peer learning exchanges, completion of the assessment exercises, participation in the site visit, and substantive contribution to group presentations.

A certificate of participation will be awarded to participants who meet the attendance and engagement requirements for the programme. Participants who are unable to attend all sessions should notify the course coordinator in advance; partial certificates will not be issued. Assessment is based on participation and engagement, not on examination results.

Proposed Registration Fee Schedule

The following fee schedule applies for the 2027 edition of the course. All fees are quoted per participant in US Dollars (USD). Discounts are applied upon registration with the relevant eligibility documentation or code.

FEE CATEGORY	DESCRIPTION	FEE (USD)	DISCOUNT	NOTES
Standard Rate	Full published rate, no discount applied	**$1,850**	—	-
ASR Alumni Rate	Graduates of any previous ASR-accredited programme	**$1,400**	**$450**	*Requires proof of completion.*

Note: The registration fee covers tuition, course materials, site visit participation, and the Certificate of Participation. Accommodation, travel, per diem, and visa costs are not included unless specified in an individual invitation letter. Participants requiring a visa for Benin should ensure sufficient lead time; the course coordinator can provide a letter of invitation upon registration.