



—— African School of Regulation ——

Power Systems and Energy Regulation: A Practical Course for Non-Engineers

Call for Applications

Duration & Course Dates

Two-week online course, from 15 to 26 February 2027.

Format

Six live online sessions, comprising three two-hour sessions each week. The course combines accessible explanations with diagrams, practical examples, guided discussions and applied exercises.

Language

English

Course Fee

USD 200

Target Audience

Non-engineering professionals working across energy regulation, government, utilities, law, economics, finance, policy, research and development.

Power Systems and Energy Regulation: A Practical Course for Non-Engineers

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Two Weeks Online Course (15 to 26 February 2027)

Introduction.

Professionals working in energy regulation frequently make decisions that depend on technical features of the power system, even when their own backgrounds are in law, economics, finance, public policy, management or other non-engineering disciplines. Without a clear understanding of how electricity is produced, transported and delivered, it can be difficult to assess questions concerning system reliability, service quality, network investment, tariffs, losses, new technologies and consumer protection.

This course provides an accessible and practical introduction to power systems and links the technical foundations directly to the work of energy regulators. It avoids unnecessary mathematical detail and uses diagrams, examples and applied exercises to help participants understand the technical issues that underpin sound regulatory decisions.

The course follows electricity from generation through transmission and system operation to distribution and final consumption. Participants will also be introduced to the changing architecture of the electricity sector, including renewable generation, distributed energy resources, battery storage, mini-grids, demand response and the increasing participation of consumers as producers of electricity.

The intention is not to train participants to become power-system engineers, but to enable them to understand the technical language, concepts, data and operational realities sufficiently to ask the right questions, interpret information provided by engineers and utilities, and contribute effectively to regulatory and policy decisions.

Course Aim and Learning Objectives

The course seeks to bridge the knowledge gap between engineering, economics, commercial operations, and regulation by explaining how technical conditions in the electricity system influence costs, tariffs, utility performance, consumer bills, service quality, and regulatory decision-making.

Specifically, the course will:

- Explain the electricity supply chain and the roles of generation, transmission, system operation, distribution, and consumption.
- Introduce the principles of safe and reliable power-system operation.

- Explain common faults, outages, losses, and power-quality issues.
- Explain metering, billing, and common billing challenges.
- Introduce electricity tariff design and the relationship between costs, revenue requirements, and tariffs.
- Introduce energy regulation and the balance between efficiency, reliability, affordability, financial sustainability, and consumer interests.

Organisation.

Format and Delivery

The course will be delivered over two weeks through six live online sessions, with three live sessions scheduled each week. Each live session will be two hours long.

- The learning approach will combine accessible explanations, diagrams, practical examples, guided discussions, and applied exercises to support understanding and practical application.
- Participant learning will be assessed through module quizzes.
- A certificate of completion will be issued to participants who meet the course requirements.
- The course will be delivered in English.

Language.

The course will be delivered in English.

Target Audience

The course is designed for professionals who require a practical understanding of power systems in their work, including:

- Staff of energy regulatory authorities and government ministries;
- Professionals in utilities, system operators, and rural electrification agencies;
- Lawyers, economists, financial analysts, policy specialists, and managers;
- Development partners, researchers, consultants, and civil-society organisations; and
- Other professionals working in the energy sector.

Course Modules.

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

Module 1: Understanding Electricity and the Power-System Value Chain

This introductory session establishes the technical foundation required for the rest of the course. Participants will learn how the different parts of an electricity system fit together and why electricity has characteristics that make its operation and regulation different from many other infrastructure services. The module will cover the following key areas:

- Basic electricity concepts: power, energy, voltage, current, frequency and key units;
- Electricity generation technologies and how electricity is produced;
- Generation capacity and energy production;
- Transmission, system operation, distribution and electricity consumption;
- Load patterns, peak demand, off-peak demand and load curves; and
- Technical and commercial interactions across the electricity supply chain.

Module 2: Generation, Transmission and Real-Time Power-System Operation

This session explains how electricity is generated and transported and how the system is continuously operated to maintain security and reliability. The module will cover the following key areas:

- Conventional and renewable generation technologies and their operating characteristics;
- Generation mix, costs, economic dispatch and merit-order operation;
- Transmission networks, substations, transformers and interconnections;
- Voltage levels, transmission capacity and electrical losses;
- Regional interconnections and power pools;
- Real-time balancing of supply and demand and the role of the system operator;
- Frequency, voltage control, operating reserves and ancillary services;
- System security, network constraints, adequacy and contingencies; and

Module 3: Electricity Distribution Networks – Faults, Protection, Losses and Quality of Supply

This session brings the course closer to the consumer by explaining how distribution networks operate, what commonly goes wrong on those networks and how technical performance translates into service quality. The module will cover the following key areas:

- Structure and operation of electricity distribution networks;

- Distribution substations, feeders, transformers, switchgear and customer connections;
- Urban and rural networks, including overhead lines and underground cables;
- Common distribution faults, outages and service interruptions;
- Protection systems, fault isolation, switching and restoration of supply;
- Planned and unplanned outages and basic reliability indicators;
- Power-quality issues, including voltage variations, harmonics and flicker;
- Technical and non-technical losses and their causes; and
- Regulatory approaches to loss reduction, network reliability and quality of service standards.

Module 4: Electricity Metering, Billing and the Customer Interface

This session explains the link between the physical delivery of electricity and the commercial relationship between the utility and the customer. The module will cover the following key areas:

- Principles of electricity metering and commonly measured quantities;
- Single-phase, three-phase, direct-connected and transformer-operated meters;
- Credit, prepayment and smart metering systems;
- Meter accuracy, testing, reading and communication;
- Meter tampering, bypass and energy theft;
- Customer complaints, revenue collection and commercial losses; and
- Regulatory oversight of metering, billing and customer service.

Module 5: Electricity Costs, Tariffs and Network Regulation

This session connects the engineering system to its economic and financial consequences. The module will cover the following key areas:

- Why electricity networks are regulated and why different sector activities may require different regulatory approaches;
- Capital and operating costs, utility revenue requirements and cost recovery;
- Cost-of-service principles and how costs flow through the electricity supply chain;
- Tariff design and the distinction between revenue requirements and tariff structures;
- Energy, fixed, demand, block, lifeline and time-of-use tariffs;
- Customer categories, cross-subsidies and affordability considerations;
- How demand patterns, losses and technical performance affect costs and tariffs;

- Efficiency and quality-of-service incentives;

Module 6: Energy Regulation and the Changing Power System

The final module brings together the technical, commercial and economic concepts covered during the course and examines how they influence regulatory decisions. The module will cover the following key areas:

- Purpose and scope of electricity-sector regulation;
- Economic and technical regulation across generation, transmission, distribution, retail and system operation;
- Licensing, tariffs, investment, quality of service, performance monitoring and consumer protection;
- Balancing affordability, efficiency, financial sustainability, investment and reliability;
- Regulatory implications of variable renewable energy, distributed generation and mini-grids;
- Battery storage, demand response, prosumers and two-way power flows;
- Regulatory approaches that enable innovation while protecting consumers and system reliability.

Assessment and Certification

Learning will be reinforced through short quizzes on the course platform linked to the six live modules. The quizzes will assess conceptual understanding rather than mathematical ability. Participants who complete the required learning activities and satisfy the course requirements will receive a certificate of completion from the African School of Regulation.