



UENR | University of Energy
and Natural Resources



ICEE '26

International Conference on Energy and Engineering

CONCEPT NOTE

Theme

**Engineering The Future: Energy, Agriculture,
And Infrastructure Innovations Toward
Climate Resilience And Sustainable
Development**

Background

The growing impacts of climate change, rapid urbanization, energy insecurity, food system vulnerabilities, and infrastructure deficits continue to pose significant challenges to sustainable development, particularly in Africa. Addressing these interconnected challenges requires innovative engineering solutions that integrate sustainable energy systems, climate-smart agriculture, and resilient infrastructure development. In this context, the theme **“Engineering the Future: Energy, Agriculture, and Infrastructure Innovations toward Climate Resilience and Sustainable Development”** highlights the critical role of engineering, technology, and innovation in building resilient societies and advancing inclusive socio-economic transformation.

The theme recognizes that sustainable development cannot be achieved without reliable and affordable energy systems, resilient agricultural practices, and strong infrastructure capable of withstanding climate-related risks. Engineering innovations such as renewable energy technologies, decentralized energy systems, smart grids, precision agriculture, sustainable transport systems, green buildings, digital technologies, and climate-resilient urban planning are increasingly essential for enhancing productivity, reducing environmental degradation, and improving livelihoods. These innovations also provide opportunities to strengthen adaptive capacity, improve resource efficiency, and support low-carbon development pathways.

The conference is aligned with the United Nations Sustainable Development Goals (SDGs), particularly SDG 2 (Zero Hunger), SDG 7 (access to clean energy), SDG 9 (Industry, Innovation and Infrastructure), SDG 11 (Sustainable Cities and Communities), and SDG 13 (Climate Action). By promoting interdisciplinary research and collaborative solutions, the conference seeks to contribute to global efforts toward sustainable industrialization, food security, clean energy access, climate adaptation, and resilient communities.

The theme strongly supports the aspirations of the African Union’s Agenda 2063, particularly the vision of “The Africa We Want.” Agenda 2063 emphasizes sustainable and climate-resilient economies, modern agriculture for increased productivity, integrated infrastructure development, industrialization, technological advancement, and environmentally sustainable growth. Through knowledge exchange, innovation, and strategic partnerships, the conference aims to advance engineering-driven solutions that contribute to Africa’s long-term resilience, prosperity, and sustainable transformation.

Main Theme: Engineering the Future: Energy, Agriculture, and Infrastructure Innovations toward Climate Resilience and Sustainable Development

The sub-themes under this main theme reflect the interdisciplinary research priorities of the University of Energy and Natural Resources (UENR), aligned with its strategic agenda to advance sustainability, innovation, and societal development.

Sub-Themes (Aligned with UENR’s Schools of Energy and Engineering and Strategic Research Agenda):

1. Sustainable Infrastructure, Mining, Buildings, Environment, and Civil Innovations

- Resilient transport, water infrastructure systems, and governance
- Environmental Management

- Green building technologies and smart cities
- Climate-resilient urban planning, flooding, and disaster mitigation
- Sustainable Mining

2. Renewable Energy Systems, Energy Efficiency, Demand Side Management and flexibility

- Grid integration of renewable energy technologies
- Decentralized energy systems and micro-grids
- Energy, society, and Environment
- Energy efficiency and demand side management
- Renewable energy resources and conversion technologies
- Energy storage systems

3. Intelligent Manufacturing and Mechanical Systems

- Industry 4.0 and digital transformation, design, and manufacturing
- Automation, mechatronics, and robotics in resource-efficient systems
- Thermo-fluids, materials science, power production, and energy conversion systems
- Aerodynamics, aerospace, bio-mechanical, automotive engineering, and Climate control

4. Climate-Smart Agricultural Engineering (Climate-Smart Agriculture and Engineering)

- Mechanization for sustainable food systems
- Precision agriculture and post-harvest innovations
- Irrigation and drainage solutions for resilient food production
- Bio-Resource engineering management

5. Electrical, Electronic, and Computer Engineering Innovations

- Artificial Intelligence (AI) and Machine Learning for energy and engineering applications
- Smart grids, IoT, and embedded systems
- Power systems, protection and control systems, and cybersecurity for utilities
- Electric mobility and smart/intelligent charging systems
- Electronics and communications for energy and engineering applications

6. Petroleum and Natural Gas Engineering for a Just Energy Transition

- Innovations in oil and gas exploration and processing

- Environmental sustainability in petroleum engineering
- Carbon Capture, utilization and storage

7. Earth Observation as a Decision tool for Socio-Economic Development

- Climate Forcings, Feedbacks, Responses and Thresholds in the Earth System
- Integrated Climate Observing Systems
- Weather dynamics and forecasting
- Environmental Modelling
- Space-Atmosphere-Ecosystem Interactions
- Solar Radiation Modification

8. Cross-Cutting: Engineering Education, Policy, Economics and Entrepreneurship

- Entrepreneurial engineering and industry-academia linkages
- Gender inclusion, ethics, and governance in engineering practice
- Financing and policy frameworks for sustainable energy and engineering solutions
- Engineering and energy education

Expected Results and Impacts

- Strengthened interdisciplinary collaboration, research exchange, and industry-academia partnerships in engineering, energy, agriculture, infrastructure, and climate resilience.
- Generation and dissemination of innovative, practical, and scalable engineering solutions for sustainable development challenges.
- Development of policy recommendations and strategic frameworks to support sustainable energy, resilient infrastructure, environmental management, and climate adaptation.
- Enhanced capacity building, technical skills, and professional development for researchers, students, engineers, and practitioners.
- Increased research outputs, publications, technology transfer, and entrepreneurship opportunities in emerging engineering fields.
- Accelerated transition toward sustainable, efficient, and inclusive energy systems and low-carbon development pathways.
- Improved climate resilience, environmental sustainability, and disaster preparedness across infrastructure, agricultural, and urban systems.
- Enhanced food security and sustainable agricultural productivity through climate-smart engineering innovations.
- Increased adoption of advanced technologies such as AI, automation, IoT, and smart systems for industrial and socio-economic transformation.
- Strengthened sustainable infrastructure development, smart urban planning, and resilient community systems.

- Promotion of inclusive socio-economic growth through engineering education, gender inclusion, innovation, and job creation.
- Contribution toward achieving key Sustainable Development Goals including SDG 2, SDG 7, SDG 9, and SDG 13.

Conference Highlights

Keynote Addresses: Renowned experts and thought leaders under each thematic areas will deliver inspiring keynote addresses, setting the tone for the conference discussions.

Keynote Speakers

Experts from the following institutions will deliver speeches at the conference.

- Ministry of Energy and Green Transition
- Ministry of Environment, Science, Technology and Innovation
- Ghana Institution of Engineering
- Bui Power Authority
- Energy Commission
- BOST Energies Limited Company
- Ministry of Lands
- Swiss Embassy (Alumni)
- DAAD/German Embassy
- Green Power Brains
- Adria/Phil –International Partner (Moving Impact)
- University of Mines and Technology—Vice Chancellor
- Newmont
- National Petroleum Authority
- Ghana gas
- Ghana National Petroleum Commission
- Prof. Benjamin Asante, former Chief Executive Officer, Ghana National Gas Company,
- Ing. Dr. Kenneth Ashigbey, the CEO of the Ghana Chamber of Mines

Panel Discussions: Panel discussions will focus on innovative engineering solutions, policies, technologies, and partnerships that advance sustainable energy, climate resilience, agriculture, infrastructure, and inclusive development.

Networking Opportunities: Participants will have ample opportunities to network, collaborate, and establish partnerships with peers, industry professionals, and policymakers, fostering a community of experts committed to sustainable development solutions.

Field Visit: Participants will embark on a field trip.