FUPRE-ENERGY
BUSINESS SCHOOL

EBS Spotlight

December 2025 Edition

The global energy sector is transforming rapidly, driven by sustainability, innovation, and evolving policy frameworks. Advances in renewables, decarbonisation, and digitalised petroleum technology highlight the pace of transition towards a low-carbon future. Policy shifts and rising investment in clean energy and critical minerals present new opportunities for Africa's infrastructure and markets. Breakthroughs in research—from next-generation batteries to AI-driven energy science—are opening pathways for sustainable industrialisation. At FUPRE Energy Business School, these developments reaffirm our mission to equip leaders with the vision to drive Africa's energy transformation.

More updates in this December edition of EBS Spotlights can be found across the inside stories, offering deeper insights into energy transition, petroleum innovation, policy trends, market outlook, research breakthroughs, and partnerships.

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TABLE OF CONTENTS

COVER STORY
EBS Spotlight

RECENT ADVANCES SHAPING THE GLOBAL ENERGY LANDSCAPE

The energy sector in 2025 is undergoing profound transformation, driven by technological innovation, sustainability imperatives, and evolving policy frameworks.

This cover story highlights recent advances across six critical domains, offering insights that position FUPRE Energy Business School at the forefront of thought leadership in Africa and beyond.

ENERGY TRANSITION & SUSTAINABILITY

The global energy transition has accelerated significantly in 2025. According to the World Economic Forum's Energy Transition Index, nearly two-thirds of countries have advanced towards decarbonisation despite geopolitical and economic challenges. Record installations of renewable energy capacity, particularly solar and wind, are reshaping power systems worldwide.

A notable breakthrough is the rise of sodium-ion batteries, which are emerging as cost-effective alternatives to lithium-ion for grid storage and electric vehicles. These innovations enhance grid flexibility and support the integration of renewables. Furthermore, green hydrogen projects are scaling rapidly, with new sunlight reactor prototypes capable of producing hydrogen directly from water and solar energy. Collectively, these advances underscore the momentum towards a cleaner, more resilient energy future.

PETROLEUM TECHNOLOGY & INNOVATION

The oil and gas industry is embracing digitalisation at an unprecedented pace. Emerging technologies such as AI, IoT, digital twins, and robotics are revolutionising exploration, drilling, and refining. Cloud and edge computing now enable real-time asset monitoring, while blockchain enhances transparency in supply chains.

Operational excellence is being redefined through automation and predictive analytics, reducing downtime and improving safety. The industry's digital transformation is not merely evolutionary but a “shockwave,” reshaping business models and workflows. These advances ensure petroleum technology remains relevant in a decarbonising world by improving efficiency and reducing environmental impact.

POLICY & REGULATION WATCH

Policy frameworks are evolving rapidly to align with climate targets. In Europe, new regulations introduced in 2025 focus on chemicals management, worker protection, and stricter climate compliance. Globally, governments are rethinking energy strategies to balance energy security with decarbonisation goals.

In the United States, debates around subsidies under the Inflation Reduction Act highlight the tension between political priorities and economic realities. These developments demonstrate that regulatory landscapes are increasingly complex, requiring businesses to remain agile and compliant while pursuing sustainability.

MARKET OUTLOOK & INVESTMENT

The International Energy Agency's World Energy Investment 2025 report reveals that capital flows into clean energy continue to outpace fossil fuels. Renewables, efficiency technologies, and critical minerals dominate investment portfolios, reflecting investor confidence in the low-carbon transition.

McKinsey's Global Energy Perspective 2025 notes that geopolitical uncertainty and rising demand are reshaping markets. Risk management has become central, with companies navigating supply chain disruptions, regulatory shifts, and climate-related risks. For Africa, these dynamics present opportunities to attract investment into renewable projects and infrastructure modernisation.

RESEARCH & DEVELOPMENT SPOTLIGHT

Breakthroughs in energy science are redefining possibilities. Recent advances include solar-powered hydrogen production, AI-driven research acceleration, and next-generation battery technologies. Renewables are expected to account for over 90% of new power capacity additions in 2025, underscoring the dominance of clean energy in R&D agenda.

These innovations not only improve efficiency but also open new pathways for sustainable industrialisation, offering Africa a chance to leapfrog traditional energy models.

PEOPLE & PARTNERSHIPS

Collaboration remains the cornerstone of progress. In June 2025, the UNFCCC announced a partnership with GEIDCO to strengthen clean energy capacity in developing countries. Nigeria has also advanced renewable energy partnerships through regulatory MoUs, catalysing sustainable development.

Global energy forums emphasise partnerships that combine investment, innovation, and capacity-building. For institutions like FUPRE Energy Business School, these collaborations provide platforms to nurture talent, foster knowledge exchange, and build leadership capacity for Africa's energy future.

The advances of 2025 highlight a sector in transition; dynamic, innovative, and increasingly collaborative. From renewable breakthroughs to digitalised petroleum operations, evolving policies, and global investment flows, the energy industry is redefining itself for a sustainable future.

As FUPRE Energy Business School continues to spotlight these developments, our mission remains clear: to equip leaders with the knowledge, skills, and vision to drive Africa's energy transformation.

PROF. J. A. AJIENKA
Editorial Board Chairman

Director's Perspective:

Shaping Leaders for Africa's Energy FutureAs Director of the FUPRE Energy Business School (EBS), I am immensely proud of the strides we have made in advancing knowledge, fostering innovation, and building leadership capacity for Africa's energy transformation.

This edition of EBS Spotlight reflects not only our academic excellence but also our commitment to translating ideas into impactful solutions.One of the most inspiring highlights is the achievement of Tajudeen Musah, a pioneering graduate whose policy brief on prepaid electricity metering offers a pragmatic framework for improving energy efficiency and consumer trust in Nigeria. His work exemplifies the essence of EBS, where rigorous scholarship meets real-world application, and where our graduates emerge as catalysts for change in an evolving energy landscape.

The global energy sector is undergoing profound transformation, driven by sustainability imperatives, technological innovation, and policy shifts. At EBS, we recognise that Africa must not merely adapt to these changes but lead them. Our programmes are designed to equip professionals with the technical expertise, strategic insight, and ethical grounding required to navigate this dynamic environment. Through partnerships with industry, government, and academia, we are creating a collaborative ecosystem that nurtures talent and accelerates progress.

Looking ahead, 2026 will be a year of bold initiatives with strategic platforms that will spark innovation, and strengthen the link between research and practice.I extend my heartfelt appreciation to our faculty, students, alumni, and partners for their unwavering support. Together, we are shaping a future where Africa's energy sector becomes a beacon of sustainability, resilience, and inclusive growth.

Season's greetings and a prosperous 2026 is my wish to us all as we continue to lead with vision, innovate with purpose, and inspire with impact.

Warmly,
AKINLOYE, BENJAMIN OLABISI, PH.D, MNSE R.ENGR.
Ag. Director, Energy Business School.

Editor's Desk

As we draw the curtain on another remarkable year at the FUPRE Energy Business School (EBS), I am reminded of the profound transformation reshaping the global energy landscape. Breakthroughs in renewables, evolving policy frameworks, and shifting investments underscore a simple truth: knowledge and innovation remain the most powerful catalysts for progress.

This edition of EBS Spotlight reflects the extraordinary dynamism of the sector and EBS's pivotal role in Africa's energy transformation. Each article offers insight and inspiration, evidencing our shared commitment to shaping the continent's energy future. We celebrate milestones such as Tajudeen Musah's policy brief on prepaid electricity metering,

which provides a pragmatic roadmap for energy efficiency and consumer trust in Nigeria, a model of bridging research with real-world solutions.

As the energy sector navigates the twin imperatives of sustainability and security, our mission is clear: to equip professionals with the insight, integrity, and innovation to lead. Through strategic partnerships, cutting-edge research, and a globally anchored curriculum, we position our graduates as architects of transformation for Nigeria and beyond.

Our cover story, Recent Advances Shaping the Global Energy Landscape, highlights six domains redefining the industry: the energy transition, sodium-ion batteries, green hydrogen, digitalised petroleum technology, evolving policies, shifting investments, and frontier research. The narrative is clear, the sector is becoming cleaner, smarter, and more collaborative.

The Director's Perspective reinforces our commitment to shaping leaders who spearhead change, while celebrating Musah's achievement. Looking ahead, 2026 promises bold initiatives to strengthen the link between research and practice, positioning EBS as a beacon of resilience and inclusive growth. Professor Wumi Iledare's incisive essay, From Policy to Promise, assesses Nigeria's Petroleum Industry Act (PIA) 2021. He shows how fiscal rationalisation and regulatory clarity are reshaping oil and gas, while warning that governance gaps, such as absent regulatory boards and weak policy capacity, must be urgently addressed. His reflections remind us that sound policy must be matched by sound governance.The section on Occupational Safety and Health in the Energy Sector highlights the human dimension of energy transformation, exploring hazards across oil, gas, power, and renewables. It calls for holistic safety approaches, integrating leadership, human factors, and digital innovation, underscoring that sustainability is incomplete without safeguarding the workforce.Market Outlook reveals capital flows into clean energy now outpace fossil fuels, with Africa poised for renewable and infrastructure investment. The the Research & Development Spotlight showcases breakthroughs in AI-driven energy science, solar hydrogen, and next-generation batteries, innovations that enable Africa to leapfrog traditional models.

The People & Partnerships feature illustrates collaboration as the cornerstone of progress, from UNFCCC's alliance with GEIDCO to Nigeria's renewable MoUs. For EBS, such partnerships nurture talent and foster knowledge exchange across Africa and beyond.

This December edition affirms our commitment to excellence, leadership, and impact. As we step into 2026, let us illuminate the path to a sustainable energy future; one insight, one innovation, one milestone at a time. Our forthcoming Quarterly Lecture Series will provide dialogue on critical issues, from transition strategies to petroleum digitalisation.

On behalf of the editorial team, I extend heartfelt gratitude to our faculty, students, partners, and stakeholders for their unwavering support. Together, we are building more than an institution; we are nurturing a legacy of excellence, leadership, and impact.

Season's greetings and best wishes for a prosperous New Year.

DR. VICTOR OLUA
Editor

FROM POLICY TO PROMISE — ASSESSING THE IMPLEMENTATION IMPACT OF THE PETROLEUM INDUSTRY ACT 2021 ON NIGERIA'S OIL AND GAS INDUSTRY

By Wumi Iledare, PhD, FNAEE, SnrFUSAEE, FEIN, Professor Emeritus of Petroleum Economics. Principal Facilitator, FUPRE Energy Business School, and Executive Director, Emmanuel Egbogah Foundation

Introduction

The PIA stands as one of Nigeria's most significant legislative achievements since independence — a product of almost two decades of debate, dialogue, and reform advocacy. It demonstrates that purposeful leadership, anchored on clarity of vision and courage of conviction, can transform entrenched policy inertia into institutional reality.

The Act was not conceived merely as a petroleum reform law; it was crafted as an economic governance framework — a foundation to move Nigeria's petroleum industry from policy uncertainty to predictable performance, from rent-seeking to value creation, and from administrative discretion to institutional accountability.

At its core, the PIA was designed to correct a historical dysfunction — the concentration of policy, regulatory, and commercial responsibilities within a single institutional basket. That model bred inefficiency, blurred accountability, and fostered conflict of interest. The PIA replaced this confusion with clarity, introducing a separation of roles that aligns with global best practice: -Policy formulation resides in the Ministry of Petroleum Resources. - Regulatory oversight is vested in two agencies—the Nigerian Upstream Petroleum Regulatory Commission (NUPRC) and the Nigerian Midstream and Downstream Petroleum Regulatory Authority (NMDPRA)--Commercial operations are assigned to the Nigerian National Petroleum Company Limited (NNPCL).

This realignment represents more than bureaucratic rearrangement; it is a change in basic assumptions toward good governance, transparency, and investor confidence — the tripod on which a sustainable petroleum economy rests. For the first time in Nigeria's oil and gas history, roles are clearly defined, institutional responsibilities separated, and accountability traceable. When faithfully implemented, this model can convert what was once a rent-driven system into a value-driven industry capable of supporting national development sustainably.

Regulatory Transitions: Consolidating Institutional Gains

Since its enactment, the PIA has catalyzed visible institutional renewal. The Petroleum Commission (NUPRC) has moved decisively toward data transparency and operational accountability, introducing digital platforms for licensing and reporting that have improved investor visibility. The Petroleum Authority (NMDPRA), despite initial challenges, has begun streamlining downstream licensing, infrastructure coordination, and product quality monitoring. However, these successes remain incomplete without the constitution of both the Boards of Commission and Authority, as mandated by the Act. Board absence not only limits oversight; it undermines autonomy and weakens stakeholder trust. Institutions without governing boards risk reverting to bureaucratic dependence, thereby eroding the very independence the PIA was designed to secure.

Good policy without effective institutions is like an orchestra without a conductor — instruments may exist, but harmony is lost. For the PIA to fulfil its promise, the institutions it created must be allowed to function with the professionalism, autonomy, and accountability that the Act envisages.

INVESTMENT CLIMATE AND FISCAL RATIONALIZATION

The PIA's fiscal architecture is its most transformative achievement. For years, Nigeria's petroleum fiscal regime was uncertain, uncompetitive, and unattractive to investors. The Act changed that by rationalizing hydrocarbon taxation, clarifying cost recovery, and introducing fiscal terms that are simpler, fairer, and more predictable.

Early indicators show encouraging progress: marginal field licensees are gradually moving toward production; frontier exploration funding has been reactivated; deepwater contract renegotiations have provided fiscal certainty to long-stalled projects. These are positive signs. Yet, regulatory stability remains the key to unlocking long-term investment. Investors, as experience teaches, do not demand perfect policy; they demand predictable rules consistently applied.

Frequent reinterpretations or politically motivated amendment proposals risk reintroducing the uncertainty the PIA sought to eliminate. Reform must evolve through evidence, not agitation. The Act's fiscal reforms must also be viewed not just as investment incentives but as instruments of intergenerational justice. By ensuring fair returns to both investors and the state, the PIA moves Nigeria toward fiscal sustainability — replacing arbitrary negotiation with structured, rules-based engagement.

MEASURABLE OUTCOMES ACROSS THE VALUE CHAIN

The effectiveness of the PIA can best be assessed by its impact across the upstream, midstream, and downstream segments of the petroleum value chain.

Upstream: Crude oil production, once constrained below 1.2 million barrels per day, is gradually rebounding toward 1.6 million barrels daily. Improved security collaboration, reduced theft, and fiscal clarity are restoring investor and operator confidence.

However, the cost of production, averaging above $30 per barrel, remains unacceptably high compared to peer districts. The recently introduced Cost Efficiency Order of 2025, if harmonized with the PIA's transparency ethos, can help drive operational efficiency, eliminate waste, and enhance Nigeria's competitiveness.

Midstream: The midstream now occupies a pivotal position in Nigeria's energy development strategy. Through the Midstream and Downstream Gas Infrastructure Fund (MDGIF), the government has created a catalytic mechanism to expand gas processing, transmission, and distribution capacity.

We are beginning to witness considerable progress — the rise of virtual gas pipelines, industrial gas off-take contracts, and new LNG/CNG infrastructure. These developments reflect a deliberate shift toward positioning gas as the transition fuel of choice, bridging the gap between energy access and environmental responsibility.

Downstream: In the downstream segment, the effects of market liberalization are becoming visible. The entry of the Dangote Refinery and other modular refineries, alongside private-sector storage and distribution investments, has introduced long-absent competition into product supply. The goal of deregulation is not a market without empathy but a market without distortion — where price reflects cost, efficiency drives competition, and transparency fosters fairness. However, vigilance is required to ensure that liberalization does not give rise to private monopoly in place of public inefficiency. The regulator's duty is to ensure that the market remains free, fair, and inclusive.

Regional Relevance: Lessons for the Gulf of Guinea

The PIA's implementation journey offers valuable lessons for other petroleum provinces in the Gulf of Guinea — Ghana, Equatorial Guinea, Gabon, Angola, and Cameroon.

Three lessons stand out clearly:

1. Institutional separation enhances accountability. Laws must clearly define "who does what" to prevent administrative overlap and policy confusion.

2. Fiscal competitiveness requires balance. Tax incentives must attract capital without undermining national interest.

3. Reform must produce social dividends. Citizens must feel the benefits of governance improvements — through jobs, infrastructure, and energy access.

If Nigeria sustains the PIA's principles of transparency, separation of powers, and accountability, it can become a regional model of petroleum governance — transforming the Gulf of Guinea from a collection of resource-dependent economies into a coordinated zone of energy stability and mutual learning.

REMAINING GAPS AND GOVERNANCE IMPERATIVES

For the PIA to transition from policy intent to performance reality, certain gaps must be addressed with urgency and political will.

First, the regulatory Boards of the NUPRC and NMDPRA must be constituted without further delay. These Boards are not ceremonial; they are governance anchors.

Second, policy formulation capacity within the Ministry of Petroleum Resources must be strengthened. Policy is the compass that guides regulation; without a strong policy base, regulators risk becoming both rule-makers and rule enforcers — a contradiction the PIA intended to prevent.

Third, data transparency must be institutionalized. Accurate, accessible, and credible data is the lifeblood of good policy and investor confidence. Transparency should not be viewed as a threat but as a trust-building tool.

Lastly, Nigeria must invest in human capital. No legal reform can outperform the character and competence of those who implement it. Building technical expertise, managerial integrity, and ethical leadership remains the surest way to make the PIA succeed.

FROM POLICY TO POSTERITY

The PIA's promise is real but not self-executing. Like every good policy, it is only as effective as the governance discipline behind its implementation. The temptation to politicize reform must yield to the necessity of institutional continuity. If applied faithfully, the Act can truly reposition Nigeria's oil and gas industry as a platform for sustainable value creation, not merely a source of revenue. It can transform Nigeria from a rent-seeking economy to a value-optimizing energy hub for Africa.

As I often remind my students, colleagues, and the public at large: "Good policy without good governance is like new wine in old wineskins — the outcome is waste." Let us, therefore, uphold the spirit of the PIA, not just its letters. Let us build institutions that outlive personalities, foster policies that survive administrations, and nurture a petroleum industry that creates wealth with integrity and equity. The journey from policy to promise must now deliver the harvest of posterity, not applause.

SIGNIFICANCE OF OCCUPATIONAL SAFETY AND HEALTH IN THE ENERGY SECTOR

By Coach Daniel Thomas Ph.D., CMIOSH, FISPN, FCP, FIMC, CMC, CLC
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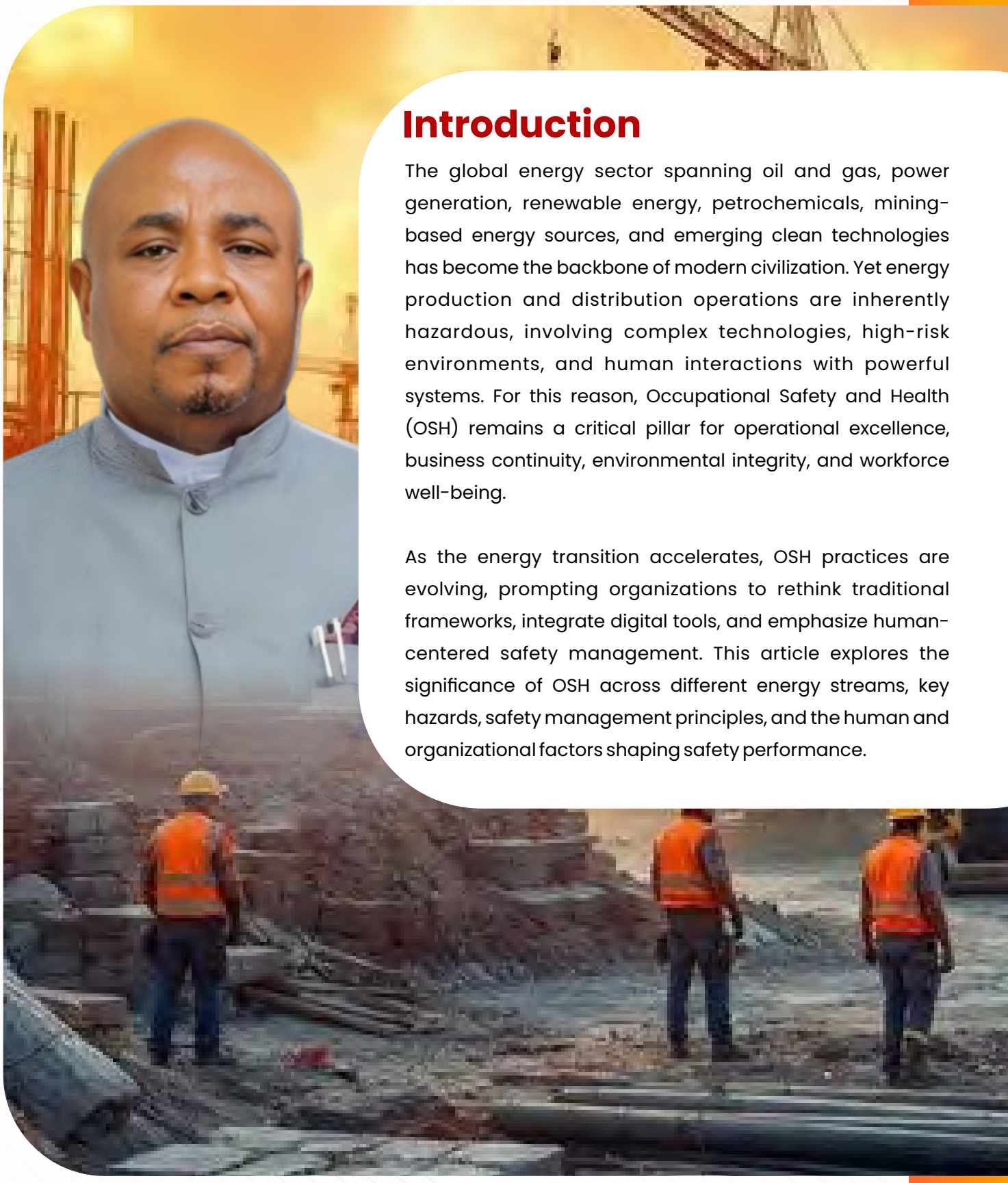


Introduction

The global energy sector spanning oil and gas, power generation, renewable energy, petrochemicals, mining-based energy sources, and emerging clean technologies has become the backbone of modern civilization. Yet energy production and distribution operations are inherently hazardous, involving complex technologies, high-risk environments, and human interactions with powerful systems. For this reason, Occupational Safety and Health (OSH) remains a critical pillar for operational excellence, business continuity, environmental integrity, and workforce well-being.

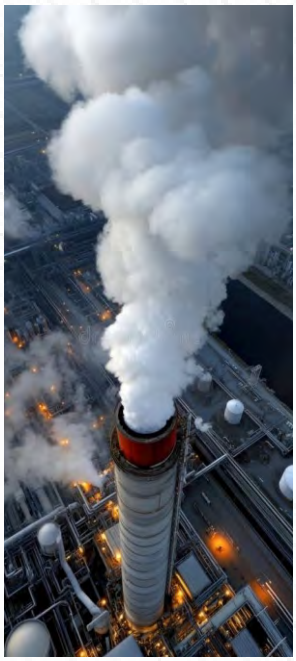
As the energy transition accelerates, OSH practices are evolving, prompting organizations to rethink traditional frameworks, integrate digital tools, and emphasize human-centered safety management. This article explores the significance of OSH across different energy streams, key hazards, safety management principles, and the human and organizational factors shaping safety performance.

WHY OSH IS CRITICAL IN THE ENERGY SECTOR?

- **High-risk operations and technologies:** Energy operations involve drilling, lifting, high-pressure systems, rotating equipment, confined spaces, electrical installations, hot work, chemical exposures, and working at heights. These hazards demand systematic and proactive safety management.
- **Regulatory and stakeholder expectations:** Governments, investors, international safety bodies (e.g., OSHA, ILO, API), and host communities increasingly expect companies to demonstrate strong safety culture and performance.
- **Economic and Business Impact:** Incidents involving explosions, fires, spills, and electrocution result in asset damage, downtime, environmental liabilities, compensation costs, and reputation loss.
- **Energy transition and workforce transformation:** New technologies such as wind turbines, hydrogen systems, battery energy storage, digital control systems bring new safety challenges. A future-ready energy workforce must understand cross-domain risks.

HAZARDS ACROSS DIFFERENT ENERGY STREAMS

Oil & Gas (Upstream, Midstream, Downstream)



- **Process Safety Hazards:** loss of containment, gas leaks, fire/explosion.
- **Operational Hazards:** well blowouts, dropped objects, lifting operations, working at height, confined spaces
- **Chemical & Environmental Hazards:** H_2S, hydrocarbon vapors, corrosive materials.
- **Transport Hazards:** pipeline ruptures, tanker accidents.

Power Generation (Thermal, Hydro, Nuclear)

- **Thermal Plants:** steam explosions, electrical hazards, turbine failures, combustible dust.
- **Hydropower:** drowning risks, high-pressure water systems, structural failures.
- **Nuclear:** radiation exposure, reactor safety breaches, contamination risks.

Renewable Energy (Solar, Wind, Bioenergy)

- **Solar farms:** electrical shocks, arc flash, extreme heat exposure.
- **Wind Turbines:** working at height, blade defects, confined spaces inside turbines, remote-access risks
- **Bioenergy:** flammable biomass dust, microorganism exposure, toxic gases (CO, methane).

Energy storage, hydrogen, and emerging technologies

- **Battery storage:** thermal runaway, fire propagation, chemical leaks.
- **Hydrogen systems:** embrittlement, high flammability, invisible flames.
- **Carbon Capture and Storage (CCS):** CO_2 leaks, confined-space risks, pressure hazards.

Principles of Safety Management for the energy industry

Leadership and safety culture: Effective safety management begins with leadership commitment. Leaders create the environment for safe behaviors, reporting culture, and continuous learning.

Risk-based thinking: Risk assessment, hazard identification (HAZID/HAZOP), Job Safety Analysis (JSA), and bowtie analysis allow organizations to foresee and control risks before operations.

Process Safety Management (PSM): In high-hazard industries like oil and gas, PSM elements such as management of change (MoC), mechanical integrity, operating procedures, permit to work, and incident investigation are essential.

Human Factors Integration (HFI): Human capability, fatigue, workload, ergonomics, communication, interface design, and competency strongly affect safety outcomes. Human Factors Engineering ensures systems are designed to match human strengths and limitations.

Competence development and training: Technical and behavioral safety skills, certifications, simulation training, digital learning, and competency assessments help reduce human error.

Robust emergency preparedness: Firefighting systems, drills, evacuation plans, mutual aid arrangements, and crisis management systems reduce the impact of major incidents.

Safety performance monitoring: Leading and lagging indicators, audits, inspections, near-miss reporting, and digital monitoring tools improve ongoing safety performance.

Technology and Innovation: AI-driven predictive safety analytics, drones for inspections, robotics in high-risk tasks, digital twins, and automated shutdown systems enhance hazard control.

Safe work practices across the energy sector

- Permit to Work (PTW): ensures task authorization and hazard controls.
- Lockout/Tagout (LOTO): prevents inadvertent equipment energization.
- Confined space entry management: atmospheric testing, rescue plans.
- Working at height controls: fall arrest systems, scaffolding checks.
- Hot work safety: fire watch, gas testing, PPE.
- Electrical safety: insulation testing, grounding, safe distance rules.
- Process safety controls: alarms, interlocks, relief systems, isolation procedures.
- Journey & transport safety: defensive driving, vehicle inspection.
- Environmental Safety: spill prevention, waste management, emissions control.

CHALLENGES IN MANAGING OSH IN THE ENERGY SECTOR

- **Aging infrastructure and assets:** Several facilities operate beyond their intended lifespan, increasing risk of mechanical failures.
- **Workforce competence and skill gaps:** New technologies require upskilling; older workforce segments may struggle with digital systems.
- **Human and organizational factors:** Fatigue, stress, communication failures, poor procedures, inadequate supervision, and cultural differences contribute to incidents.
- **Contractor management:** Multiple contractors and subcontractors with varying safety maturity and culture create integration challenges.
- **Remote and hostile work environments:** Offshore platforms, deserts, swamps, and remote installations complicate emergency response and logistics.
- **Regulatory variability across regions:** Different countries have varying standards and enforcement strength, creating compliance complexity for multinational operators.
- **Balancing production pressures with safety:** High production targets may tempt unsafe shortcuts; strong governance is required to maintain safety integrity.

OPPORTUNITIES FOR THE FUTURE

- **Digital safety systems:** real-time monitoring, wearables, fatigue detection.
- **Enhanced process automation:** reduces human exposure to hazards.
- **Energy transition safety frameworks:** tailored guidelines for renewables, hydrogen, and carbon management.
- **Integrated human factors programs:** embedding human-centered design and organizational learning.
- **Collaborative Safety Ecosystems:** partnerships between academia, industry, and regulators.

Conclusion

Occupational safety and health is not merely a compliance requirement in the energy sector, it is a strategic enabler of reliability, productivity, environmental protection, and community trust. As the energy landscape evolves, organizations must adopt holistic safety approaches that integrate process safety, human factors, digital technologies, and robust management systems. A strong safety foundation positions the energy sector to support global development goals while ensuring the well-being of every worker who powers the world.

EDUCATING FOR ENERGY EXCELLENCE: BUILDING THE NEXT GENERATION OF PETROLEUM EXPERTS AT FUPRE ENERGY BUSINESS SCHOOL

By Wumi Iledare, PhD, FNAEE, SnrFUSAEE, FEIN, Professor Emeritus of Petroleum Economics. Principal Facilitator, FUPRE Energy Business School, and Executive Director, Emmanuel Egbogah Foundation

In an era defined by rapid transformation in the global energy landscape, the Federal University of Petroleum Resources, Effurun (FUPRE) stands as a beacon of specialized knowledge, purposeful training, and national relevance.

Established to deepen Nigeria's technical capacity in petroleum and energy studies, FUPRE Energy Business School has become a cradle for nurturing thinkers, innovators, and future industry leaders determined to shape the nation's energy future.

At the heart of this mission is FUPRE's commitment to academic excellence and character formation. The University understands that sustaining Nigeria's energy industry demands more than proficiency in engineering principles, geoscience interpretations, or management frameworks.

Economics and management matter as much in the emerging energy landscape. It requires professionals equipped with both technical expertise and the ethical grounding necessary to navigate complex policy, economic, and technological challenges. This is why FUPRE invests heavily in strengthening foundations, inspiring curiosity, and encouraging intellectual rigor from the first year of study through graduation in the Energy Business School.

In FUPRE EBS, there is a clear emphasis on bridging theory with practice. Hence the adoption of the Triple Helix Plus lecture delivery modality. Students are engaged not only through coursework but also through case study immersion and exposure to real-world problem-solving.

Whether in the petroleum module, energy module, or the fast-growing renewable and sustainable energy module, FUPRE EBS's pedagogy reflects its understanding of the dynamic energy ecosystem into which its graduates must step.

Recent initiatives further underline this commitment. Strategic partnerships with industry players, collaborations with research institutes, and the strengthening of university–industry linkages are enhancing the relevance of FUPRE EBS's academic delivery. These initiatives also offer students and staff opportunities to participate in impactful research—ranging from energy transition analysis to innovation in local content, environmental stewardship, and cost-effective petroleum operations.

The University's leadership deserves commendation for its dedication to building a strong institutional framework that prioritizes quality. From infrastructure development and curriculum enhancement to faculty capacity building and student mentorship programs, FUPRE is steadily positioning itself among the leading specialized universities in Africa. The vision is clear: to produce graduates who are globally competitive yet deeply rooted in the developmental aspirations of Nigeria's energy sector.

Beyond academics, FUPRE's culture encourages discipline, collaboration, and community service. Students are taught the value of professional conduct, time management, and ethical reasoning. The University continues to remind its young scholars that the pursuit of knowledge must be accompanied by a commitment to integrity—especially in a sector as sensitive and strategic as petroleum and energy.

As the world advances toward cleaner energy solutions while still relying heavily on hydrocarbons for stability, FUPRE EBS stands at a pivotal point. It is uniquely positioned to support Nigeria's drive for energy security, sustainability, and economic diversification. EBS's graduates will be the ones to design energy policies and lead the innovations that will define the nation's future. The story of FUPRE EBS is therefore a story of nation-building.

It is a story of hope anchored in knowledge, of growth driven by purposeful leadership, and of transformation powered by the brilliance of young minds eager to serve. As the EBS continues to evolve, its guiding philosophy remains unchanged: to educate for excellence, empower for leadership, and inspire for impact.

As we acknowledge FUPRE EBS's progress, we also recognize the achievement of the two master's graduates in sustainable management, who are part of the six trailblazing students whose dedication and discipline exemplify the true spirit of FUPRE EBS.

Thanks to the ongoing support from faculty, administration, industry partners, and government stakeholders, the University is poised to achieve even greater accomplishments. The journey of FUPRE EBS continues forward, driven by the steadfast belief that education—when inspired by vision and integrity—is the most powerful means of shaping the future of energy, the economy, and the nation.

Energy Transition & Sustainability Insight

on renewable energy, decarbonisation, and green initiatives. (Dr Amieyeofori V Felix, PhD Sustainable Energy Engineering), MD/CEO, Entek Integrated Resources Limited, Director/Faculty, FUPRE EBS)

Introduction

Energy, to the ordinary people on the street, could mean one or both of human power and resilience, and/or capacity to do something, which aligns with the elementary scientific definition of energy in physics, as the capacity for doing work. While there are several definitions of energy, the one that seems encompassing is one presented by David Watson (2014) as:

"Energy is a property or characteristic (or trait or aspect?) of matter that makes things happen, or, in the case of stored or potential energy, has the "potential" to make things happen. By "happen", we mean to make things move or change condition. Examples of changes in condition are changes in shape, volume, and chemical composition (results of a chemical reaction). There are also changes in pressure, temperature, and density which we call a "change of state" in thermodynamics. Phase changes, such as changing from solid to liquid, or liquid to vapor, or back the other way, are also good examples of condition changes. Something happened! Without energy, nothing would ever change, nothing would ever happen. You might say energy is the ultimate agent of change, the mother of all change agents. Whenever anything happens or changes there is an energy change."

Energy is the cornerstone of human development and is harnessed through deliberate search for more secure

Classification of Energy

energy sources, changing needs and consumption patterns, technological innovation, geopolitical dynamics and environmental implications, demand, and supply dynamics, and of course government policy directions.

Energy sources are subgrouped into renewable or non-renewable sources, and the use of either form of energy is also based on the desire for better energy quality, measured in the form of energy density, storability, intermittently, transportability, availability, scalability, environmental externalities, and energy return on energy invested minus net energy..

Renewable energy sources are derived mainly from self-regenerative natural sources while non-renewable, though also exist in nature, are not self-replenishing in nature. They are depleting sources and include mainly fossil fuel which consist of petroleum crude oil, gas and coal. Fossil fuels originate from organic remains of plants and animals or fossils, buried several millions of years, which are acted upon by pressure and temperature in the presence of microbes. On the other hand, renewable energy sources are solar, geothermal, wind, biomass, bioenergy, and hydropower energy.

Besides these broad classifications, energy can also be Green, Clean, or Sustainable energy: Green energy sources emit near zero greenhouse gases, radiation, or chemical contaminants, and only exerts localized impacts on the

environment, as they rarely threaten plant or animal species with habitat loss, population reduction, or extinction.

Clean energy on the other hand is energy that does not pollute the environment nor increases the amount of greenhouse gases that may contribute to climate change. It only emits negligible amounts of carbon dioxide, radiation, or chemical contaminants, and therefore have minimal to zero carbon and hence impact on the environment.

Sustainable energy describes energy sources that not only meet present economic and social needs but also guarantees the energy requirements of future generations.

According to Kukreja (2021), an energy source must have three basic qualities to be described as sustainable and these are (i) it must be naturally replenishable; (ii) ability to improve its energy efficiency through technology, and (iii) must be available in the long term. Sustainable energy sources must also meet economic, political, social, and environmental considerations, which means that, it must be economically viable, politically supported, socially equitable, and environmentally acceptable.

Owen and Garniati (2016) thus defined sustainable energy as any economically viable energy resource (not only electricity) that is not, in its lifecycle, a net contributor to climate change and does not have a substantially negative environmental or social impact (actual or potential). Sustainable energy thus requires a balanced composition between energy security, economic development, and environmental protection.

Energy Transition

The early fuel system was biomass such as wood, charcoal, peat, straw, dried dung and animal oil, and with human development, men began to build their homes with specific alignment to the sun and wind for heating, cooling and light. With time, human began to harness the power of water and wind for transportation for sailing as early as 3500 BC by the Chinese, the Romans and Indians, and the use of wind power for sailing continued far into the 19th century until they were replaced with the invention of the steam-powered ships in the 1800s.

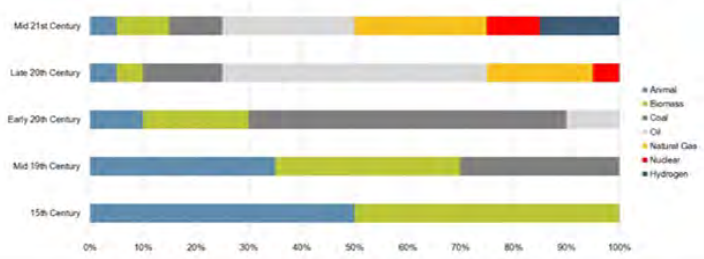
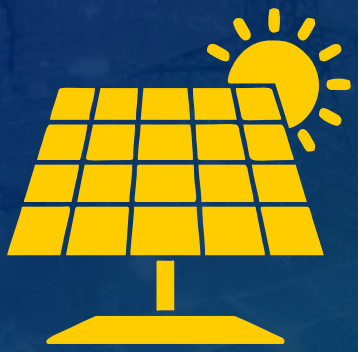


Figure 1: Historical Evolution and Use of Various Energy Sources: Sources: Rodrigue 2020.

The first energy transition from wood to coal occurred around 1600s in Europe due to scarcity of wood to meet the increasing energy demand with coal becoming the dominant enery source in the 1780s. The use of coal soon expanded with the invention of the first coal fired power plant in the world by the French in 1875. Coal soon began to pose environmental challenges at the onset of the 20th century, a condition that gradually paved way for a more qualitative energy source – petroleum in oil and gas. Petroleum was found to be more flexible and adaptable than coal, as kerosene that was refined from crude became more reliable and relatively inexpensive compared to "coal-oils" and whale oil for fueling lamps. Naturally, with these better qualities, and with innovative technologies in the 20th century, the second energy transition occurred with petroleum crude oil taking over from coal as the preferred fuel to power the global economy

It is interesting to note that previous energy transitions have always been driven organically by society, economics and thermodynamics; coal replaced wood because of its advantage over wood due to its higher energy density, more abundant and presumably cheaper than wood. Oil became the dominant fuel as man embraced the mobility offered by automobiles and aero planes and the Navy embraced the tactical advantages oil offered over coal. The use of natural gas in the mix offered a cleaner and more combustion power than coal and oil. Hydroelectric power was added to the energy mix because of its cost advantage, and also easier to control as a renewable energy, while nuclear energy came into the mix, though for military use, but also for many countries that lacked indigenous supplies of fossil fuels such as Sweden, Finland, France, Japan and S Korea.



Past energy transitions have always taken advantage of the benefits from new energy sources, however, both energy sources are used simultaneously until the new source becomes dominant in the energy mix. The current energy transition is driven primarily to arrest the rising global temperature, which has resulted to extreme global warming and weather conditions due mainly to high carbon and methane and other greenhouse gas (GHG) emissions into the atmosphere. The transition to renewables is to limit the global average temperature within 1.5OC by the end of the century as agreed at the 2015 Paris Climate Summit (or COP21).

The current rise in global temperature above the pre-industrial period of 1880-1900 is due to accumulated heat in the atmosphere and considering the size and tremendous heat capacity of the ocean, this rise is very significant. It shows that the heat absorptive capacity of the ocean has been impacted seriously. This is what is now driving regional and seasonal temperature extremes, reducing snow cover and sea ice, intensifying heavy rainfall and changing habitat ranges for plants and animals. It was in the attempt to arrest the deterioration that led the Intergovernmental Panel on Climate Change (IPCC) of the United Nations, to issue stern warnings that global warming from pre-industrial levels must not exceed 1.5°C to avoid irreparable damage to the planet. This further led to the coming together of 196 countries in 2015 to pledge to work together to slow global warming by cutting emissions and other steps under a collective Paris Agreement, the world's first comprehensive climate change agreement. The main goal of the Paris Agreement as stated in Article 2.1 a is to keep the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C, while Article 4.1 emphasizes on attaining Net Zero Emissions and Decarbonization in the second half the century.

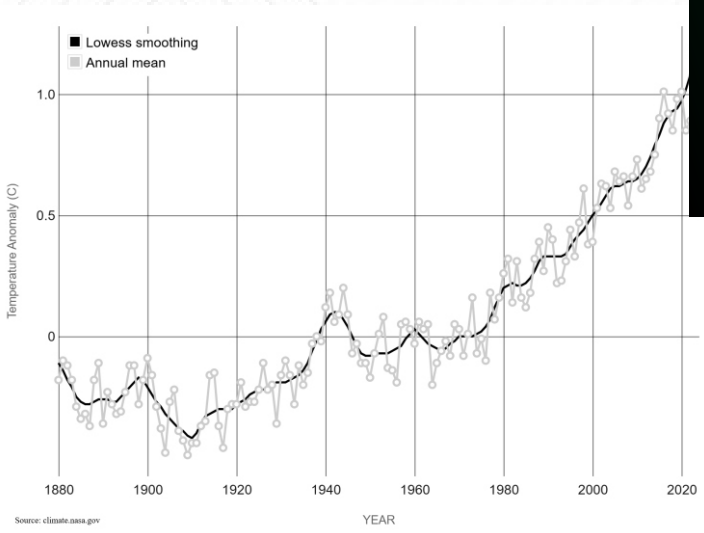


Figure 2: Global Land-Ocean Temperature Index, Nasa, 2025

The current energy transition is therefore to reduce the anthropogenic emissions and achieve a net zero emission state by moving away from fossil fuel or non-renewable energy sources to much cleaner renewable energy sources. Over the previous 50 years, global warming has preceded in an almost linear fashion, consistent with an almost linear increase in the total greenhouse gas forcing. The warming spike in 2023/2024 suggests that the past warming rate is no longer a reliable predictor of the future, and additional factors have created conditions for faster warming, at least in the short-term. (Rohde, 2025). Earth's global temperature in 2024 was 2.3 degrees Fahrenheit (or about 1.28 degrees Celsius) warmer than the 20th century baseline 1951 - 1980. NASA records show global temperature was 2.65 degrees Fahrenheit (1.47 degrees Celsius) warmer than the late-19th century (1850 - 1900) preindustrial average (NASA, 2025)`.

A goal of keeping global warming to no more than 1.5 °C (2.7 °F) above pre-industrial has been an intense focus of international attention. The long-term average global temperature is likely to effectively cross the 1.5 °C (2.7 °F) threshold in the next 5-10 years. While the 1.5 °C goal will not be met, urgent action is still needed to limit man-made climate change. Each increment of additional warming, e.g. 1.6 °C, 1.7 °C, etc., will lead to additional and compounding climate change impacts that can still be avoided if effective mitigation steps are made to reduce man-made greenhouse gas emissions (Rohde, 2025).

As a fully integrated oil, gas, and energy professional, I was privileged to be a member of the Energy and the Economy Perspective group chat. While perusing earlier messages on the forum, my attention was drawn to a virtual application notice introducing the FUPRE Energy Business School (EBS) programme. In hindsight, my intuitive decision to take a second look at that post proved invaluable, especially when viewed against the quantum of knowledge acquired throughout the duration of the programme.

Looking back with fond memories and a sense of nostalgia, the inaugural class commenced on 14 July 2025. Coincidentally, I was out of the country at the time. However, despite being thousands of miles away from Nigeria, I was able to fully participate and quickly began to enjoy the benefits of the programme. I remained actively engaged and well connected with my colleagues and the entire academic resource team, led by Professor Wumi Iledare and ably supported by Dr Benjamin Akinloye, Director of Studies, FUPRE EBS. At the end of the class, Professor Iledare proposed that I serve as the class representative, a decision that was unanimously endorsed by the cohort.

It is no gainsaying that programmes of this nature are often confronted with peculiar hurdles and challenges. As the pioneer class, we experienced our fair share of these initial hiccups, including internet connectivity issues, lecture scheduling, and the need to adapt to the intensity and volume of work embedded in the academic curriculum. However, as my colleagues and I gradually settled into the new routine and learning environment, these challenges gave way to familiarity, seamless interaction, and a cordial working relationship between students and the academic resource team. This organic growth was sustained throughout the entire duration of the programme.

FUPRE EBS INDEED A WELCOME EXPERIENCE

Despite its intensity, the programme revealed significant opportunities. The depth of learning, exposure to energy economics and policy, and the multidisciplinary approach adopted by FUPRE EBS positioned participants for relevance in a rapidly evolving energy landscape. I would confidently recommend the FUPRE EBS programme, and in the not-too-distant future, I envisage it filling a potentially widening gap in the development of energy resource professionals, serving as a platform of choice for producing practical and industry-ready energy experts for Nigeria and beyond.

In conclusion, I am truly honoured and humbled to be part of the pioneering postgraduate set of the FUPRE Energy Business School. I extend my sincere appreciation to the Emeritus Professor Wumi Iledare and the entire academic resource. I am particularly grateful to my Master's dissertation supervisor, Dr Terhemen Andzenge, for his welcoming and supportive approach, vast wisdom, subject-matter expertise, and invaluable guidance throughout the research process—an experience I will treasure for a long while. Kudos also to the entire staff and management for the knowledge you all selflessly and passionately imparted to us over the past year.

I pledge to keep the FUPRE flag flying always. In Shaa Allah, I will continue to remain a good ambassador of this great institution, FUPRE EBS.

MUSAH MOBOLAJI
Sustainable Energy and Management

EBS

MY OPINION ON ENTERING THE ENERGY BUSINESS SCHOOL

Entering the Energy Business School (EBS) of the Federal University of Petroleum Resources, Effurun (FUPRE) has been a timely decision and a significant milestone in my professional journey. As a trained geologist who transitioned into the business side of the oil and gas industry—and having obtained a Master's degree in Energy and Petroleum Economics over a decade ago—the need to close emerging knowledge gaps became increasingly imperative, given the rapidly evolving global energy landscape.

Prior to this, my familiarity was largely limited to the Institute of Petroleum Studies (IPS), University of Port Harcourt, which was incidentally managed by a distinguished pool of legendary researchers and industry experts—many of whom now serve as principal facilitators at FUPRE-EBS. Undoubtedly, the experience of my classmates and me over the past year has been remarkably evident in our workplaces and career advancement.

The faculty is simply outstanding—an exceptional blend of intellectuals drawn from academia, industry, and government. Their depth of expertise and commitment to knowledge transfer have had a profound impact on my colleagues and me. Despite the demands of rigorous classes, intensive assignments, and bi-monthly examinations, we deeply value and respect their teachings.

FUPRE-EBS provides an ideal platform for the Triple Helix development model, driving innovation, entrepreneurship, and nation-building—much like what is obtainable in developed economies, where Ivy League and top-tier universities serve as key stakeholders in economic growth and national prosperity.

The past nine months have opened doors to boundless knowledge and diverse opportunities for me, even though they came at a cost—one that is undoubtedly worthwhile. For anyone seeking to advance their skills, knowledge, and professional experience in the energy industry, the Energy Business School, FUPRE, is an institution well worth exploring.

LUCKY IGHOYOTA
FUPRE-EBS, Batch 2
Class Governor

Celebrating a Milestone Achievement at FUPRE EBS

Meet Tajudeen Musah – one of the first graduands of the Energy Business School (EBS), Federal University of Petroleum Resources, Effurun (FUPRE).Tajudeen has distinguished himself by producing a forward looking policy brief titled:"Policy Document on Local Government Administrations and Nigerian Electricity Regulatory Commission Partnership for Accelerated Prepaid Metering Deployment in Nigeria – A Framework for Effective Electricity Metering as a Catalyst for Energy Efficiency and Security."

Policy Brief Summary

This policy proposition sets out a decentralised framework to accelerate the rollout of prepaid electricity meters across Nigeria. Anchored in the Electricity Act 2023, it highlights the urgent need to close the metering gap, with only 14.5% of households metered as at the end of 2024.

Key recommendations include:

- A partnership between NERC and all 774 Local Government Administrations (LGAs) to drive grassroots enumeration, validation, and consumer engagement.
- Achieving 75% metering coverage by 2030, thereby eliminating estimated billing and enhancing consumer trust.
- Leveraging LGAs' capacity to ensure transparency, accountability, and effective monitoring.
- Establishing a National Metering Dashboard to track installations, revenue, and consumer data in real time.
- Introducing Results Based Financing to incentivise performance and ensure financial sustainability.

The brief projects that accelerated deployment could grow annual Distribution Company (DisCo) revenues to at least N5 trillion, while simultaneously improving energy efficiency and strengthening Nigeria's electricity market.

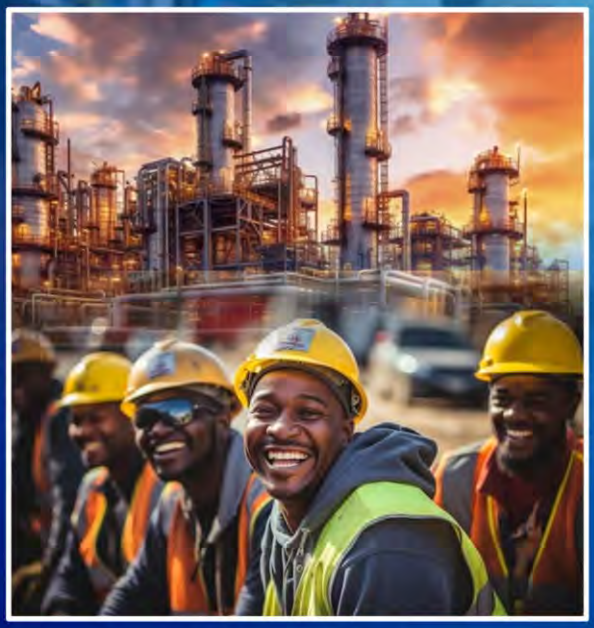
A Landmark for FUPRE EBSThis achievement marks a significant milestone for FUPRE EBS, showcasing the calibre of its pioneering graduates and the School's commitment to producing thought leaders who shape national energy policy. Tajudeen Musah's work demonstrates how academic research can translate into practical solutions for Nigeria's energy challenges, reinforcing EBS's role as a hub for innovation, policy development, and industry impact.

FUPRE EBS proudly celebrates this milestone and looks forward to more groundbreaking contributions from its graduates.

MUSAH MOBOLAJI
Sustainable Energy and Management

FUPRE-ENERGY BUSINESS SCHOOL

The Federal University of Petroleum Resources, FUPRE, calls for applications for its 2025/2026 FUPRE Energy Business School, FUPRE EBS, BATCH 4 academic session into its innovative and inter disciplinary postgraduate programmes. FUPRE EBS offers professional Post Graduate Diploma, Masters, and Doctorate degrees in Petroleum and Energy Studies, which are consistent with the mandate of the Federal University of Petroleum Resources, to build workforce capacity, sharpen the skills of professional talents, provide the requisite managerial skillsets, and applications of analytical tools in managing, and by extension, African and Global Energy, Oil and Gas, and Power sectors.



ADMISSION STARTS FROM
December 8, 2025 THROUGH January 23, 2026
CLASSES BEGINS MARCH 4, 2026

PROGRAMMES

PGD: 9 Months	Masters: 5 Modules 12 months	Doctorate: 8 Modules- 24 months
Total Programme fees: N3.5million	Total Programme fees: N5 million	Total Programme fees: N8 million
International Students: $3,500.00	International Students: $5,000.00	International Students: $8,000.00

Note: (Masters & Doctorate) – Each module has 2 courses with 2-4 thesis and 2-4 facilitators. Seminar Fees to be determined

ADMISSION REQUIREMENTS

PGD:
A higher National Diploma, HND with a minimum of lower credit or less than 3.0 CGPA or 3rd Class with no Industry Experience

MASTERS:
PGD with a minimum CGPA of 3.5 on a 5-point scale; Bachelor's degree with a minimum of Second Class Lower Division

PROFESSIONAL DOCTORATE:
Master's degree in Petroleum and Energy Studies, Social Sciences, Economics, Business, Engineering or related Field

All Candidates with Nigerian Citizenship must have completed their NYSC Programme with NYSC Discharge or Exemption Certificates

PROGRAMME OFFERED

- Doctor of Sustainable Energy and Management (DSEM)
- Doctor of Energy Economics and Management (DEEM)
- Doctor of Petroleum Economics and Management (DPEM)
- Master of Sustainable Energy and Management (MSEM)
- Master of Energy Economics and Management (MEEM)
- Master of Petroleum Economics and Management (MPEM)
- Post Graduate Diploma in Petroleum and Energy Studies, (PGD-PES)

PRINCIPAL FACILITATOR

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For Application form Visit: https://fupreebschool.org/application-form/

Email: info.ebs@fupre.edu.ng or Whatsapp me privately @ +234 805 765 7494

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FUPRE-ENERGY BUSINESS SCHOOL

EBS Spotlight

December 2025 Edition

MERRY Christmas and Happy New Year

"This Christmas season reminds us that light and energy are not only forces of nature but also symbols of hope, innovation, and progress. As we celebrate the joy of the festive period, we also reflect on the power of knowledge and collaboration to fuel breakthroughs in energy and business. May this season of gratitude inspire us to continue driving innovation that transforms industries and communities, just as the Christmas lights brighten our world. Together, we look forward to a new year filled with discovery, growth, and all round increase.Stay tuned as we roll out our Quarterly Seminar Series 2026, where we will share insights, spark ideas, and shape the future of energy innovation."

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