The Nigerian Engineer

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THE ROLE OF ENGINEERING IN THE DELIVERY OF GAS VALUE CHAIN IN NIGERIA

- **Why FG Must Prioritise Professional Appointments in Key Leadership Roles**
  — ***Engr. Oguntala***
  NSE, President

- **Nigeria needs Extensive Pipeline Transportation to unlock huge Gas Reserves**
  — ***Engr. Dr. Babatope Kayode, MNSE***
  Petroleum Engineering Specialist, Saudi Aramco

- **We are the champions of local content, proving to people that Nigerians are good Engineers**
  — ***Engr. Georf Onuoha, FNSE***
  MD, B.G Technical Ltd and Affiliates) and Pipeline Pigging Products & Accessories (PPA)

- **Limited Infrastructure, Paucity of Funds Bane to Advanced Gas Development in Nigeria**
  — ***Engr. Chichi Emenike, FNSE***
  Acting Managing Director Neconde Energy Limited

- **FG laying resilient gas infrastructure across Nigeria**
  — ***Rt. Hon. Ekperikpe Ekpo***
  Hon. Minister of Petroleum Resources (Gas)

- **Solewant Group has Furthered Development of Gas in Nigeria by Providing Critical Infrastructure & Creating Local Content**
  — ***Solomon Ewanehi***
  GMD, Solewant Group

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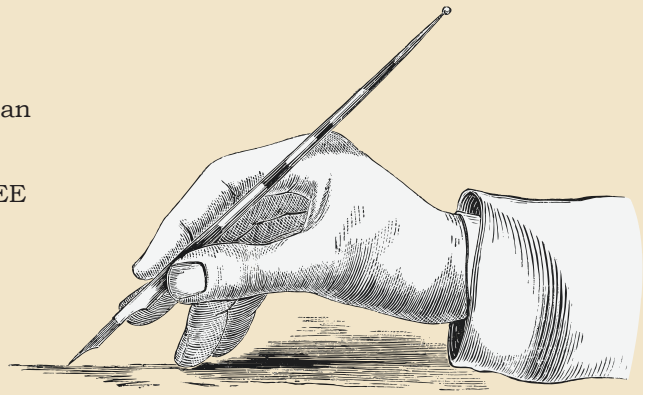
Vision

The Nigerian Society of Engineers shall be one of the very best Engineering professional bodies in the world.

Mission

1. The Nigerian Society of Engineers is dedicated to the provision of quality services aimed at embracing professional competence and development of its members at all times.
2. The Nigerian Society of Engineers is also committed to focus on collaboration with, influencing and providing quality advice to the various arms of Government, industry, commerce, academia and the society at large for the purpose of upliftment of the country as a whole.
3. The Nigerian Society of Engineers shall make meaningful contributions to the advancement of technology worldwide.



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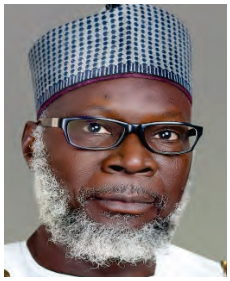

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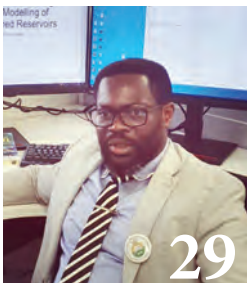

Editorial

Engr. Felicia Nnenna Agubata, PhD, FNSE
Chairman Editorial Board

The Nigerian Society of Engineers (NSE) has once again demonstrated its commitment to national development by selecting the highly relevant and impactful theme for this edition of its magazine: **"The Role of Engineering in the Delivery of Gas Value Chain in Nigeria."** This theme deepens the indispensable role of engineering in harnessing Nigeria's vast natural gas reserves as the 9th largest gas reserves in the world. According to Nigeria Upstream Petroleum Regulatory Commission (NUPRC), the reserves of associated and non-associated gas stood at 209.26 trillion cubic feet (TCF) as of January 1, 2024 hence transforming them into valuable resources that drive economic growth. From exploration to production, transportation and distribution, engineering remains the backbone of the gas value chain. However, despite Nigeria's immense potential, challenges such as inadequate infrastructure, regulatory bottlenecks and investment limitations continue to hinder the full realization of the sector's potential. Addressing these issues requires innovative engineering solutions, strategic investments and policy reforms. Despite its vast gas possibilities, Nigeria faces several engineering-related challenges, including outdated infrastructure, gas flaring and inadequate technical capacity. Addressing these challenges requires investment in research and development, local capacity building, and the adoption of cutting-edge engineering technologies. Policy support and collaboration between government, private sector, and academic institutions are crucial to driving innovation in gas engineering. Engineering is at the heart of Nigeria's gas value chain, playing an indispensable role in exploration, processing, transportation, and utilization. As Nigeria seeks to leverage its gas resources for economic diversification and energy security, engineering expertise will remain a key driver in overcoming challenges and unlocking the full potential of the sector. Through sustained investment in engineering infrastructure and human capital, Nigeria can position itself as a global leader in the gas industry, ensuring long-term economic prosperity and sustainable development.

The NSE, under the visionary leadership of Engr. Margaret Aina Oguntala, FNSE has witnessed remarkable progress within just one year of her presidency. A trailblazer and an exemplary leader, Engr. Oguntala has prioritized engagement and collaboration with key stakeholders, to advocate for stronger support, grants, and funding opportunities for engineers and engineering initiatives. Her relentless drive for excellence has also led to several groundbreaking partnerships recorded by the society in the past one year. These partnerships and collaborations were aimed at fostering collaboration, capacity building, and expanding professional opportunities for engineers. Furthermore, she has also demonstrated strategic foresight through the inauguration of several key committees to guide NSE's long-term growth and ensuring continuous professional development through specialized training for all cadres of engineers.

This edition also features exclusive interviews with esteemed energy and gas experts, as well as insightful discussions on the evolving landscape of the engineering sector with personalities such as the Honorable Minister of Petroleum (Gas) Rt. Hon. Ekperikpe Ekpo among others. Profiles of some distinguished professionals whose contributions continue to shape the industry, reinforcing the critical role of engineering in national development were also featured.

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Special pullout on the

2024 INTERNATIONAL ENGINEERING CONFERENCE, EXHIBITION & AGM

Monday 18th November, 2024

HIGHLIGHTS OF DAY 1

PRESIDENT CHARGES ENGINEERS ON ETHICS, PROFESSIONALISM AS 211 BAGS FELLOWSHIP

CONFERENCE KICKS-OFF WITH SEAMLESS REGISTRATION PROCESS

GROOVY PRESIDENTIAL COCKTAIL PARTY

JETS CLUB COMPETITION WINNERS TO BE ANNOUNCED THIS MORNING

What the President told the Conferees

This event is an acknowledgment of the exceptional contributions of these noble professionals to the engineering field. It also marks not only a personal achievement for each of the Fellows but a significant milestone in the advancement of engineering excellence in our beloved country.

I express heartfelt felicitations to each of you who have reached this esteemed status in the Society. Your dedication, commitment and exemplary service to our noble profession have paved the way for this recognition, and you should be proud of yourselves. Congratulations!

A Charge on Adherence to Ethics in Engineering Practice.

I would like to remind you today that this elevation is an added responsibility on you as you expected to discharge your reinforced roles as the emissaries and purveyors of ethical leadership and integrity in our industry.

Our work as Engineers involves yielding positive impacts on the lives of citizens, development of communities, and the future of our great country. Therefore, I must emphasise to you, our dear conferees, that at this stage in your careers, you cannot afford to falter on matters of ethics. Each one of you, from henceforth, has the responsibility to double your commitment to upholding the high standards that guide the practice of our profession.

As you go forth into the field, you must continue to endorse and defend the key elements of ethical practice in engineering which include prioritizing Safety & Health, Integrity and Honesty, Environmental Sustainability, Respect for Intellectual Property, as well as Compliance with Regulations.

I assure you that when we conform to both professional and ethical standards in the practice of engineering, we would not only prevent harm to the people, we would further secure the trust of the public, and ensure sustainable advancement for our dear country.

As Fellows and leaders within the NSE, you have a unique responsibility to exemplify our values and to serve as guardians of our professional standards. I urge you to do just that.

Strengthening the Engineering Community Against Infiltration

Distinguished ladies and gentlemen, the aforementioned charge on ethical practice of engineering reminds us all that there are clear and present challenges facing the engineering sector in Nigeria, and they include quackery, sharp practices and infrastructure failures which, if unattended, have the capacity to tarnish our profession's reputation.

These issues are of deep concern to the Nigerian Society of Engineers because of their interwoven nature to the well-being and safety of our people. The time has come for us, as Nigerian Engineers, to take a stand and claim our rightful place in the nation's development.

This is a call to action and a declaration that the NSE can no longer sit idly while our industry suffers from infiltration and misconduct perpetrated by quacks. As a community, we must remain vigilant in ensuring that our standards are met and that only qualified, registered Engineers represent our field.

On our part, my administration has prioritised enhancing the professional competence of

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members, especially the Young Engineers by organising specialised training programmes across all the geopolitical zones of the country.

As newly inducted Fellows, I urge you to embrace this vital role wholeheartedly. Your voice, influence and expertise will be instrumental in shaping policies, mentoring Young Engineers and advocating for a stronger engineering profession in Nigeria.

We must also harness our collective strength to collaborate on innovative solutions that will uplift the engineering community in Nigeria.

Conclusion

In conclusion, I would like to reiterate to the new Fellows that this conferment should serve as a reminder that you have the power to influence the future of engineering in Nigeria. There may be challenges ahead, but with your passion, dedication and commitment, I have no doubt that we can forge a brighter and more sustainable future.

Together, let us build an engineering community that is characterised by true professionalism, integrity and unparalleled excellence.I will not forget to commend and also congratulate the distinguished Board of Fellows of the Society under the distinguished leadership of Engr. Kamila Wopa Maliki, FNSE, mni, for the great job they have done in making this event happen. I thank you all very much for your dedication to your assignment as a Board.

Thank you and God bless you all

Engr. Margaret Aina Oguntala, FNSE
President/Chairman-in-Council

WELCOME ADDRESS BY CHAIRMAN, BOARD OF FELLOWS/COLLEGE OF FELLOWS OF THE NIGERIAN SOCIETY OF ENGINEERS AT THE CONFERMENT OF FELLOWSHIP

HELD ON NOVEMBER 18, 2024 AT THE ABUJA CHAMBERS OF COMMERCE AND INDUSTRY, LUGBE, ABUJA.

Protocol

It is with great pleasure and on behalf of the President and Chairman of Council, the Council and Board of Fellows/College of Fellows of the Nigerian Society of Engineers that I welcome you all to this great occasion of the Conferment of Fellowship of our great Society. The Nigerian Society of Engineers welcome our Conferees and their Spouses to this occasion.

Today, a total of Two Hundred and Eleven (211) engineers who have distinguished themselves in the practice and promotion of engineering will be conferred with the Fellowship of the Nigerian Society of Engineers (FNSE) which is the highest level any practicing engineer in Nigeria can attain to. These eminent professionals are commended for having scaled through the procedures for screening and assessment as the process has remained very thorough but fair. This is why, even though the membership strength of the Society is currently about 82,000 members, only a few percentage have been elevated to the Fellowship grade. Therefore, any Engineer with the appellation 'FNSE' is always accorded appropriate recognition and privileges.

The President and Chairman of Council, Fellows, Conferees, Ladies and Gentlemen, it is once more my great delight to welcome you all to this occasion, where we will interact to celebrate the new Fellows, as well as exchange ideas on how to play active roles in the infrastructural and economical growth of our dear nation. Distinguished Engineers, please join me in welcoming our extraordinary President, the 34th President and first female President of the Nigerian Society of Engineers, a trailblazer and a leader of outstanding vision and dedication who continues to set new standards for our Society and for the profession at large.

Engr. W. Maliki Kamila, FNSE, FAEng, mni
Chairman, BOF/COF






ENGR. OGUNTALA BOOSTS MORALE OF SCHOOL CHILDREN AT JETS CLUB COMPETITION

The President of the Nigerian Society of Engineers (NSE), Engr. Margaret Aina Oguntala, FNSE inspired school children at the JETS Club competition finals yesterday by celebrating their efforts and achievements. In a congratulatory message, the President remarked;

"The competitors who have made it to this final stage are all winners. Your journey to this point reflects not only your brilliance but also your resilience, determination, and passion for learning. To all participants, regardless of the outcome today, you are all winners."

The Junior Engineers, Technicians, and Scientists (JETS) Competition for secondary schools across Nigeria is a key programme of the Nigerian Society of Engineers.

The President further commended the students' courage and innovative spirit, emphasising: "Your courage to compete, create, and innovate embodies the very essence of engineering, which is solving problems and building a better future."

This encouraging message undoubtedly motivated the students and underscored the critical role of young minds in shaping the future of engineering and technological innovation in Nigeria

Represented by the Vice President of NSE (Membership Services), Engr. Rose Madaki, FNSE, she said, "First and foremost, I wish to wholeheartedly congratulate all the competitors who have made it to this final stage, your journey to this point reflects your resilience, determination, and passion for learning. To all participants, regardless of the outcome today, you are all winners. Your courage to compete, create, and innovate embodies the very essence of engineering which is solving problems and building a better future".

She acknowledged the Teachers saying "I would like to commend the Teachers who have tirelessly mentored and guided these young talents. Your role as educators and motivators is invaluable, as you ignite the spark of curiosity and knowledge in these future leaders".

Similarly, the President, commended the management of the participating schools, "thank you for recognising the importance of initiatives like this and for creating an enabling environment for your students to excel".

The JETS Club, as a platform, according to the President has always been about nurturing creativity among young Nigerians. She saidIt is designed to inspire critical thinking, encourage practical problem-solving skills, and ignite a passion for Science, Technology, Engineering, and Mathematics (STEM). The competition we witness today is a direct reflection of these objectives, bringing us closer to a future where young Nigerian Engineers, scientists, and inventors will lead in technological advancements globally She added.

She commended the Young Engineers Forum of Nigeria (YEFoN) under the Chairmanship of Engr. IkakKe Afangideh, MNSE for their role in ensuring the success of the programme. "Your efforts in mentoring, organising, and supporting this initiative are commendable. This is a clear demonstration of the impact of peer collaboration and dedication to professional growth. You are shaping the next generation of Engineers, and for that, I salute you'she said.

Seamless Registration Process at the NSE 2024 Conference.



Presidential Cocktail Party












Tuesday 19th November, 2024

HIGHLIGHTS OF DAY 2

PRESIDENT TINUBU FLAGS-OFF 2024 CONFERENCE

His Excellency, Bola Ahmed Tinubu, GCFR
President Commander-in-Chief of Armed Forces
Federal Republic of Nigeria

- **Announces Establishment of Engineering & Innovation Fund**
- **To Provide Grants to Engineers, Technologists Working on Solutions to National Challenges**
- **Pledges Government Support to NSE**

Honorable Minister of State, Works Bello Goronyo

President of Nigeria Society of Engineers, Engr. Margaret Aina Oguntala, FNSE

Engr. Margaret Aina Oguntala and Spouse, Engr. Theophilus Oguntala, FNSE

From Right Engr. Sen. Femi Kila, FNSE, Hon. Minister of Agriculture and Food Security, Sen Abubakar Kyari and Engr. Sen. Iyiola Omisore, FNSE.

Engr. Oguntala presents a plaque to Sen. Kyari

Middle Governor of Borno State, Engr. Prof. Babagana Zulum, FNSE,mni, Flanked on his right by Sen. Kyari and on His Left by Alh. Goronyo

Hon. Minister of Agriculture and Food Security, Sen Abubakar Kyari

Honorary Fellowship Conferment /Awards









Exhibitions



Cross-Section of Spouses









Cross-Section of Engineers at the Opening Ceremony






Plenary Section






Poster Presentations



Young Engineers






Wednesday 20th November, 2024

HIGHLIGHTS OF DAY 3

NSE STEPS-UP EFFORT ON FOOD SECURITY BY COLLABORATING WITH MEGA AGRICPRENUER FIRMS

SIGNS MoUs WITH

- ASSETRISE
- LANCASTER FARMS

GROUP DYNAMICS COMPETITION

DIVISIONS

BRANCHES

BRANCHES






YOUNG ENGINEERS




INTERNATIONAL DELIGATES


PANELISTS


PANELISTS

WELFARE NIGHT









COMMUNIQUÉ OF THE 57TH INTERNATIONAL ENGINEERING CONFERENCE, EXHIBITION AND ANNUAL GENERAL MEETING OF THE NIGERIAN SOCIETY OF ENGINEERS (NSE), "ABUJA 2024", HELD AT THE ABUJA CHAMBER OF COMMERCE AND INDUSTRY, UMARU MUSA YAR'ADUA EXPRESS WAY, AIRPORT ROAD, ABUJA, FROM 18TH TO 22ND NOVEMBER, 2024

PREAMBLE

The 57th International Engineering Conference, Exhibition and Annual General Meeting (AGM) of the Nigerian Society of Engineers (NSE) tagged "ABUJA 2024" was held at Abuja Chamber of Commerce and Industry, Umaru Musa Yar'Adua Express Way, Airport Road, Abuja from 18th to 22nd November, 2024. The theme of the Conference was "SUSTAINABLE ENGINEERING SOLUTIONS TO FOOD SECURITY AND CLIMATE CHANGE".

The five-day event comprised variety of activities including Opening Ceremony, Plenary Sessions, Panel Discussion and Technical Presentations. Other activities were Induction of Fellows, Group Dynamics for NSE Divisions and Branches, Students' and Young Engineers Forum. The Conference was enriched with other equally important social activities that enhanced interaction amongst the participants. These included Special Fellowship Conferment Ceremony / NSE Presidential Awards, Spouses Programme, Cultural/Award and Welfare Night as well as Annual General Meeting (AGM), Closing Ceremony and Dinner/Dance. All activities were well attended by Engineers, Researchers, Academia, Industrialists, National and Foreign Investors. Policy makers, Legislators, Development Partners, Experts and Students were also in attendance. More than 4,517 participants registered for the Conference. A total number of 10 lead papers were discussed at 2 Plenary Sessions, 3 Panel Sessions, while 56 technical papers on the 10 sub-themes were presented and prizes were awarded to the overall best poster presenter and best poster presenter for each of the Sub-themes of the conference. Foreign delegates / participants from Ghana, Kenya, Liberia and Sierra Leone Institutions of Engineers, Cannada, India and South Africa participated fully in the Conference.

The Conference was supported by TotalEnergies, NNPCL, COLEMAN Wires and Cables, Gramen Petroserve, Rainoil, LEE Engineering, NLNG Limited, Hensek Integrated Services Limited, KENOL, EcoStruxure, Protogy and Panal Holdings. These companies also participated in the Conference Exhibition along with other companies and the Divisions of NSE.

INTRODUCTION

The Opening Ceremony was chaired by the President of the Nigerian Society of Engineers, Engr. Margaret Aina Oguntala, FNSE, who also delivered the welcome address. The Chairman, Conference Planning Committee (CPC), Engr. Etido Inyang, FNSE, represented by Engr. Mutiu Odesanya, FNSE welcomed members to the Occasion. In attendance at the Conference were the President and Commander-in-Chief of the Armed Forces of the Federal Republic of Nigeria, His Excellency Bola Ahmed Tinubu, GCFR, was ably represented by Hon. Bello Muhammed Goronyo, Esq - Hon. Minister of State for Works, Rt. Hon. Inuwa Garba – House Committee on Science and Engineering, representing Speaker House of Representative, RT. Hon. Tajudeen Abass, His Excellency Engr. Prof. Babagana Umara Zulum, FNSE, FNIAE, mni, CON, Governor of Borno State who also presented a Goodwill message, Engr. Uka Ifeanyi, Commissioner of Police representing Inspector General of Police. Goodwill messages were also presented by the representatives of the Governors of Abia, Kaduna, Lagos, Nasarawa and Oyo States among others.

Other dignitaries at the occasion included Engr. Gwandu Umar, MNSE, Representing Hon Minister of Petroleum, Engr. Dr Samson Opaluwa, FNSE, Chairman, Council of Reg. Builders of Nigeria and BoT, Asiwaju S. K. Onafowokan, Chairman, Coleman Wire and Cables, Alh. Ismaila Zakari, mni, President of APBN, Engr. Kori Shettima, FNSE, Special Adviser on Works to Executive Governor of Borno State, Engr. Ganiyu Johnson, FNSE, Former House of Representative member, Former Special Adviser for Works, Lagos State, Hon. Bello Ayuba, Borno Sate Chairman APC, Barr. Lauskarima, Borno State Secretary APC, Hon. Garba Saje, APC Stakeholder, Borno State Chapter, President of COREN, Engr. Prof. Sadiq. Z. Abubakar, FNSE, FNIAE, FAEng, the Chairman NSE Board of Trustees, Engr. Dr. E. J. S.

Uujamhan, FNSE, and all Service Chiefs of Army, Navy, Air Force and Inspector General of Police were ably represented. Captains of Industries in attendance included George Onafowokan, MD Coleman Wire & Cable, Engr. Micheal Onafowokan, Executive Director, Coleman Wire & Cable, Engr. Adokiye Tombomiye, FNSE, OON- EUP Upstream, NNPCL, Engr. Umar Ahmed Farouk, FNSE, NPOM, MD/CEO NAMA, Rear Admiral B. Iyalla – Chief of Naval Engineering, Engr. Elozino Olaniyan, General Manager Safety and Environment Shell Nigeria, Engr. Raimi Olabanji FNSE, Manager Engineering, Shell Nigeria, Prof. Samson Duna, DG / CEO, Nigerian Building and Road Research Institute(NBRRI), Dr Mustapha Abudullahi, DG / CEO Energy Commission of Nigeria, Dr. Tau Idris, DG/CEO Nigerian Nuclear Regulatory Authority, Engr. Ebiye Tarabina - Chairman Directorate for Project Monitoring and Evaluation Board, Bayelsa, Dr. Usman Yusuf, DG / CEO of Nigerian Nuclear Regulation Authority ably represented by Mr. Vyonku Mathias, Director of Administration and Human Resources. Also in attendance were National EXCO Members of NSE, Past Presidents, Spouses and Members of the Society.

The foreign delegates who attended the occasion included Ghanaian delegation led by President of Ghana Institution of Engineering, GhIE, Ing. Kwabena Bempong, delegation from Kenya Institution of Engineers, Kenya (IEK) led by President Eng. Munyoki Shammah Kiteme, delegation from Engineering Society of Liberia led by President, Eng. Dadley D. Toe, and delegation from Sierra Leone Institution of Engineers (SLIE) led by President, Ing. Oba Jones, FSLIE. Other dignitaries included Engr. Sen. Femi Kila, FNSE, Engr. Sen. Iyiola Omisore, FNSE among others distinguished personalities.

NSE Presidential award was given to 14 distinguished individuals, which included serving and former State Governors, Chief Executive Officers of public and private companies.

The Opening Ceremony was concluded with the tour of the Exhibition stands, led by the representative of the President of the Federal Republic of Nigeria.

OBSERVATIONS

The following observations were made at the end of the Conference and Annual General Meeting:

1. Interconnectedness of climate change and food security as conference highlighted the complex relationship between climate change and food security. Rising temperatures, erratic rainfall, soil degradation, and increased frequency of extreme weather events threaten agricultural productivity and food availability. As climate change disproportionately affects developing countries like Nigeria, addressing food security requires urgent, integrated, and innovative engineering solutions.
2. Advances in sustainable engineering, such as precision agriculture, smart irrigation, renewable energy integration, and climate-resilient infrastructure are essential in adapting to climate-related challenges. It also observed that such solutions not only enhance agricultural productivity but also reduce the carbon footprint of food production and distribution systems.
3. Water scarcity and inadequate irrigation systems are significant constraints to sustainable agriculture in Nigeria. Out of over 84 million hectares of arable land, only about 1.6 million hectares are irrigated, leaving the rest reliant on unpredictable rainfall. Conference observed the need for advanced water management solutions, including water-efficient irrigation, rainwater harvesting, and wastewater reuse.
4. With substantial post-harvest losses representing about 40% of food produced in Nigeria challenging food security. Conference underscored the importance of improved storage facilities, cold chains, and transportation networks. Such infrastructure reduces food spoilage, ensures better market access, and strengthens the resilience of food supply chains.
5. Renewable energy was identified as a critical enabler for climate-resilient food production systems, especially in rural and off-grid areas. Solar and wind energy can power irrigation, mechanized farming, and cold storage, reducing dependence on fossil fuels and contributing to sustainable food security.
6. Effective climate change mitigation and food security solutions require collaboration across sectors. Public-private partnerships, including involvement from government, private sector, NGOs, and local communities, were recognized as critical stakeholders to scaling sustainable engineering solutions and ensuring long-term impact.
7. Policy frameworks that support climate-smart agriculture, encourage innovation in sustainable engineering, and facilitate climate finance are essential.
8. Conference noted that empowering local farmers and rural communities with knowledge, skills, and access to sustainable technologies is crucial for enhancing

food security. Capacity building ensures that these communities can implement and sustain climate-resilient agricultural practices over the long term.

9. Conference observed that oil and gas companies are among the largest sources of carbon emission which significantly contribute to climate change; thus, affecting food security and sustainable environment.
10. Conference noted that oil spills have devastating effect on farmland and ecosystem. With engineering innovation, oil companies adopt technology to prevent oil spills and minimize damages to agricultural land in their operational areas.
11. Modern agricultural machinery has revolutionized farming practices, playing crucial roles in boosting productivity and minimizing labour-intensive farming processes. However, indigenous farm machinery is limited in quantity and variety due to lack of appropriate manufacturing capacity, materials and equipment for mass production.
12. The conference observed that about 70% of Nigeria's agriculture produces are from rural areas. However, poor road network hinders transportation and distribution of produce from farms to markets, causing spoilage, raising costs and reducing accessibility to consumers.
13. The conference commended the President of the Federal Republic of Nigeria, His Excellency, Asiwaju Bola Ahmed Tinubu, GCFR for pronouncement of establishment of National Engineering and Innovation Fund which is purposely designed to provide grants and resources to Engineers and Technologists working on solutions for Nigeria's unique challenges

RECOMMENDATIONS

The following recommendations emanated from the Conference and Annual General Meeting:

1. Nigerian Engineers are challenged to deploy their expertise in collaboration with relevant organizations like National Space Research and Development Agency (NASRDA), Advanced Space Technology Application Laboratory (ASTAL), Nigeria Meteorological Agency (NiMet), National Information Technology Development Agency (NITDA), National Agricultural Land Development Agency (NALDA), National Water Resources Institute (NWRI), among others, using data analytics, GIS, AI, and IoT-enabled systems to support precision agriculture for better monitoring of weather patterns, soil health, and water availability for optimal farming practices.
2. Government and relevant stakeholders (research institutes, food processors, aggregators, exporters among others) should embrace and promote innovations and technologies that enhance agricultural productivities and reduce greenhouse gas emission.
3. Federal Ministry of Agriculture and other relevant stakeholders should support efforts of agricultural research and development institutions on developing sustainable irrigation systems, including rainwater harvesting and efficient irrigation technology, to ensure water availability for farming all year round to increase land under cultivation and increase crop yields in Nigeria.
4. Government and relevant funding organizations to support various research outputs and commercialisation of sustainable storage facilities and processing technologies being developed or adapted in Nigeria to minimize post-harvest losses.
5. Government should promote and provide enabling environment and work in collaboration with relevant stakeholders in harnessing affordable renewable energy (solar, hydro, wind, biomass among others) that can revolutionize agriculture in rural farming communities.
6. Conference recommends that there should be synergy among stakeholders in mitigating climate change at both individual and societal levels. Also, relevant government agencies should implement recommendations on different climate change mitigation and adaptation strategies relevant to Nigeria as contained in Intergovernmental Panel on Climate Change (IPCC) report of Conference of Parties (COPs).
7. Conference recommends that government policies should prioritize funding for research, capacity-building, and incentives for adopting sustainable practices in agriculture through Bank of Agriculture (BOA), Bank of Industry (BOI) and other funding bodies.
8. Nigerian Society of Engineers through its Divisions and Branches in collaboration with relevant stakeholders should strengthen its professional development programme and create extension services on agricultural best practices to farmers.
9. Conference acknowledged

efforts of the oil and gas industries in mitigating effect of climate change. However, regulatory bodies should synergise with these companies to reduce water pollution, gas flaring and promote soil remediation to boost farming in the local communities and support livelihood.

10. The conference commends the efforts of oil and gas companies in development and deployment of technology to mitigate effect of oil spills in their operational environment. However, companies should work with local agricultural stakeholders to develop and deploy technologies that mitigate effect of oil spills in food production systems.
11. Government and other stakeholders should encourage, support and enhance capacity of indigenous agricultural machinery manufacturers and research institutes such as National Centre for Agricultural Machinery (NCAM), National Science and Engineering Infrastructure (NASENI), Product Development Agency (PRODA), National Incubation Centre in developing and mass production of agricultural machinery.
12. Government at all levels and donor agencies should fund construction, rehabilitation and maintenance of rural roads to ease challenges of food transportation in Nigeria.
13. The conference recommends that Nigerian Society of Engineers (NSE), Council for the Regulation of Engineering in Nigeria (COREN) and other Engineering professional bodies should ensure follow up for effective take-off of the National Engineering and Innovation Fund.

LIST OF NATIONAL EXECUTIVE COMMITTEE

The Society successfully deployed online voting for the election of the officers to run its affairs in 2025. The AGM ratified the following as the list of the National Executive Committee of the Nigerian Society of Engineers.

1.	Engr. Margaret Aina Oguntala, FNSE	President
2.	Engr. Ali Alimasuya Rabiu, FNSE, MFR	Deputy President
3.	Engr. Tijjani Usman, FNSE	Vice President (North-East)
4.	Engr. Ibrahim Aliyu Dutsinma, FNSE	Vice President (North-West)
5.	Engr. Aluyah Dauda Okodugha, Ph.D., FNSE	Vice President (South-South)
6.	Engr. Rachel Serumun Ugye, FNSE	Vice President (North-Central)
7.	Engr. Felicia Nnenna Agubata, Ph.D. FNSE	Vice President (South-East)
8.	Engr. (Dr.) Halimat S. C. Adediran, FNSE	Vice President (South-West)
9.	Engr. Usman Abdu Abubakar, FNSE	North-East
10.	Engr. Tijjani Dayyabu, FNSE	North-West
11.	Engr. Prof. Olumide Moses Ogundipe, FNSE	South-West
12.	Engr. Abraham Aghadike, FNSE	South-East
13.	Engr. Dr. Ndifon Mbeh Agbiji, FNSE	South-South
14.	Engr. Dauda Musa, FNSE	North-Central
15.	Engr. Tasiu Sa'ad Gidari Wudil, FNSE	Immediate Past President
16.	Engr. Joshua Egube, FNSE	Executive Secretary

Signed:
Engr. Margaret Aina Oguntala, FNSE.
President Nigerian Society Engineers (NSE)

Signed:
Engr. Joshua Egube, FNSE
Executive Secretary

The Role of Engineering in the Delivery of Gas Value Chain in Nigeria

Engr. Johnson Otitolaye, MNSE

Natural gas fossil fuel is a clean source of energy generation that is essential for the socio-economic development of a society. Nigeria is rich in proven natural gas reserve that is estimated to stand at 206 Trillion standard Cubic Feet (tcf) as at 2022. This huge deposit would be valuable only to the extent that end users can have unfettered access to its useful form. Interestingly, almost all known fossil fuels (natural gas inclusive) are not found on the surface of the earth but are deposits deep down into the earth crust. Therefore, a number of deliberate processes and chain of activities must be carried out before the useful form of natural gas can be made valuable to end-users.

These distinct processes and activities that turns gas deposits found at some considerable feet below the earth surface into useful commodities, are mostly engineering based activities. This is why the theme of the Nigerian Society of Engineers' magazine for the first quarter of 2025: ***"The role of Engineering in the delivery of gas value chain in Nigeria"*** is apt and appropriate at this period when the energy sector of the Nigeria economy is turning to gas as the major feedstock. Some value of natural gas to Nigeria economy include; its use as feedstock for petrochemical plants, fuel for electricity power generating stations, natural gas in form of Compressed Natural Gas (CNG) is being encouraged for use as fuel for appropriate types of automobiles, it is equally utilized for cooking in various homes. Above all, it contribute significantly to the Gross Domestic Product of the nation. This article only give some highlights of the role of engineering in the delivery of gas value chain in Nigeria and will not delve into full scale description of the detail engineering processes that are involved.

The natural gas value chain in Nigeria is an integrated process which comprise of the upstream, midstream and downstream sectors with each sector's operation depending on each other. The upstream or the exploration and production (E&P) section include all activities for the discovery of sub-surface onshore or offshore gas fields, drilling of exploratory and appraisal wells, field development, and extraction/ production of the natural gas to the surface.

The midstream sector on the other hand involves the transportation, storage and trade of natural gas via pipelines or in the form of liquefied natural gas (LNG).

While the downstream sector is responsible for the processing of raw natural gas into feedstock for generation of any desired energy form or petrochemical industries. It also includes the selling and distribution of processed natural gas through the natural gas distribution companies

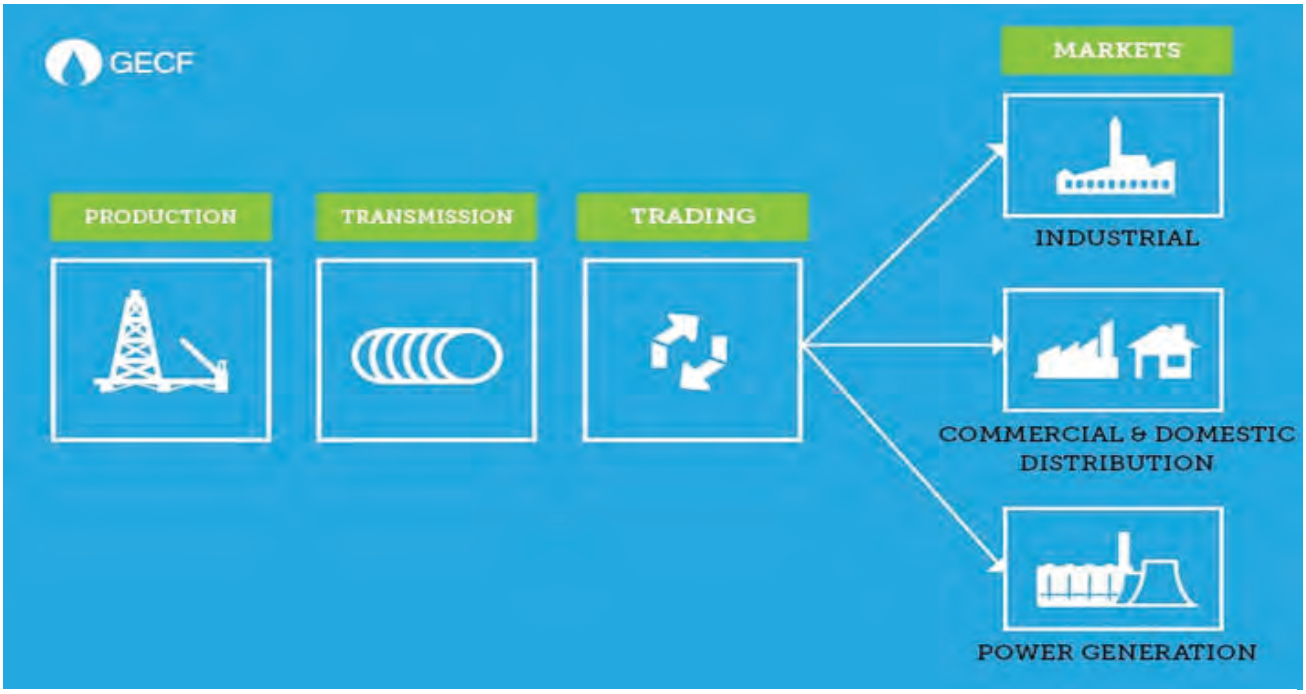


Fig. one: **Block representation of gas value chain (Adapted from GECF)**

by delivering it to respective final consumers such as power generation, industrial companies, commercial entities and private households. Figure one below is a block representation of the three level gas value chain.

The role of Engineering in the upstream sector of gas value chain

Engineering concept is at the heart of all planning and technical issues that surround operation of the upstream sector of the Nigerian gas value chain. Gas exploration through seismograph provides the only direct way to acquire sub-surface structural information of a field without first drilling a well. Seismograph involves an engineering principle of shock waves travel and reflection from the sub-surface rock layers to reveal patterns of rock formations such as faults, anticlines and folds where oil and gas deposits have a good chance of being found in large quantity. Where oil and gas are found together in the same well, the gas is called Associated Gas (AG) while deposit of gas only without oil is known as None Associated Gas (NAG). Majority of gas production in Nigeria at present are through the associated gas. Associated gas accounted for about 66% of total gas production in the last 18 years with None Associated Gas making up the balance of 34%. Technical details of oil and gas exploration is beyond the focus of this article. Suffice it to point out that engineering is the very foundation of oil and gas exploration.

The next critical process after exploration and confirmation of likelihood of oil/gas deposits in commercial quantity is drilling of wells. Oil and gas well drilling is a complex engineering process which includes operation of earth-moving equipment to build access roads, level the location and dig pits, trenches and the cellar for the rig which will house some of the drilling equipment. When this is completed, the drilling rig and related equipment as well as needed supplies can be moved into the drilling location so that drilling operations may begin. After drilling a well to an expected depth, the actual quantity of oil and gas discovered will determine whether the well will be operated for production eventually or not. A well that qualify for production require other infrastructures to be built and installed before production can commence. Some of these essential engineering infrastructures include; the flow line which is a small diameter pipeline that carry oil and gas from a well head to the nearest flow station, and the flow station itself which collects oil and gas from wells in one or more fields. In the case of a well with AG, the oil and gas are separated at the flow stations. Oil/gas from some well heads can flow naturally because of the earth pressure but there are some others that require installation of pressure pumps to enforce the flow. It is obvious that the entire process of drilling oil and gas wells, construction and installation of flow lines and the main flow stations are all complex engineering practice which underscore the critical role of engineering at the gas upstream sector in ensuring the delivery of Nigeria gas value chain.

The midstream sector of the Nigeria gas value chain

Operation at the midstream sector of the gas value chain is equally complex with a number of necessary surface infrastructures that are

accomplished by engineering solutions. I shall not attempt to explain the complex engineering infrastructures associated with the midstream section of the gas value chain beyond to pinpoint the fundamental role of engineering at this sector of the Nigerian gas value chain. At the midstream sector, raw gas is transported via pipelines for storage in gas terminals (special capacity tanks) that could be at a considerable distance from the gas wellhead. Trading of gas in form of Liquefied Natural Gas (LNG) can also take place at the midstream sector of the gas value chain which may necessitate involvement of none engineering professionals (commercial managers, accountants, safety managers, etc.). However, bulk of the midstream value chain operations and activities such as construction and operation of gas transportation pipelines to connect wellheads to the storage tanks as well as construction and installation of gas terminals are essentially engineering based works. Conclusively, engineering is pivotal to all operations at the midstream sector of the gas value chain much as it is to the upstream sector.

The place of engineering in the downstream sector of the gas value chain

The downstream sector of the gas value chain is where processing of raw natural gas into its various useable forms take place. The selling and distribution of processed natural gas also take place at this stage. There is involvement of natural gas distribution companies that deliver the processed gas to respective final consumers such as industries, commercial entities and private households. This sector require comprehensive engineering infrastructure base for storage, transmission and distribution. Engineering principles and methods are the fulcrum for fabrication, construction of storage tanks to receive processed gas, transmission pipelines as well as gas outlets (numerous kinds of gas cylinders, taps and gauges, dispensing machines, etc.) at users' premises. The trucks, the trains and the rails as well as ships for transporting processed gas across customers' locations are all products of engineering.

With the above highlights of the critical involvement of engineering in the three sectors of gas value chain, it is safe to say that engineering is actually the ***'strong chain'*** in the delivery of gas value chain in Nigeria which if absent or weak at any of the identified sectors would completely jeopardize delivery of the entire gas value chain.

Notable gaps in the delivery of gas value chain in Nigeria.

Critical analysis of gas utilization in Nigeria vis-à-vis the volume of proven gas reserve in the country shows a low gas utilization to gas reserve ratio suggesting there are gaps in the delivery of gas value chain in Nigeria. These gaps exist in the three sectors of the gas value chain. For example, the gas upstream sector is not yet developed to the expected level needed to support optimal gas exploration and production to bridge the low gas production-to-gas reserve ratio. Lack of adequate investment in gas exploration and production is a major factor responsible for creation of these gaps. This is understandably so, because gas exploration and production infrastructure financing is almost entirely foreign capital dependent because it is highly capital intensive. Foreign Direct Investment (FDI) are not easily attracted to the venture of gas exploration and production particularly for none associated gas (NAG) because of some unfavourable regulatory conditions. One of such regulations is the domestic gas obligation policy of government which gives priority to domestic gas supply over exports. An offshoot of this is price regulation for domestic gas sales. Domestic gas consumption on the other hand

is not yet matured making gas off-takers very few and resulting in low returns on investment and lengthen or uncertain period to recoup investments by FDIs. These conditions are some of the caucuses responsible for low investment attention particularly on none associated gas exploration and production. Associated gas (AG) on the other hand is found as a result of oil exploration and production, so its equivalent upstream investment is lean when compared to that of NAG. This cost can even be partially defrayed from sales of oil gotten out of the same well. To this extent, AG upstream investment is more attractive to investors than NAG. Hence, the lopsided production percentage of 66% AG to 34% NAG in Nigeria over the last 18 years.

The combine effect of domestic gas obligation policy, domestic gas price regulation and few number of ready gas off takers somehow lower the overall interest of International Oil Companies (IOCs) in gas processing even in the case of large volume of associated gas. This is one of the reasons why IOCs flare large volume of associated gas extracted from oil wells. Although, there are clear laws against flaring of gas by oil producing companies in the country, these regulations have not been able to curb the practice completely. Innovation and incentives such as building mini gas powered electricity generating thermal plants close enough to oil wells to serve as ready off takers for flare gas would bring out value out of the flared gas and at the same time reduce the carbon foot print in the country. There are many other innovative ways to bring value out of flared gas that has been suggested by experts in the filed which can be of immense benefits to the Nigeria gas sector.

Another notable gap in the delivery of gas value chain in Nigeria that I like to mention is none aggressive development of the gas downstream sector infrastructure making gas distribution to end-users inefficient. Regulation of domestic gas pricing makes investment (foreign and local) on gas infrastructure a bit unattractive. Development of efficient gas distribution pipelines is still in its infancy in the country. Although, majority of the large gas-powered electricity generating stations are supplied with gas fuel through pipelines, distribution of gas into private households by pipelines has not yet gain traction in Nigeria. Gas for household use are currently been transported inter and intra city by be use of articulated vehicles. To compound issues, the road infrastructures are not in the best conditions to support this method of haulage. There are lots of risks associated with movement of gas by trucks which often lead to loss of products, loss of infrastructures, loss of revenue, and sometimes loss of human lives. The cumulative effect of the high risks involved in long distance haulage of gas through road transportation is reduction penetration of gas into large parts of the Nigeria population. With this, accessibility to gas fuel will remain difficult and would further lower returns on investment (RoI) for operators. Metered gas fuel distribution through tinny pipelines into end-users' premises particularly private households and commercial entities is an investment opportunity area that holds potential for high returns on investment for investors. Although, required enabling legislations and regulations to make this workable may not be in place yet, I believe the time to start the conversation around this is here.

Conclusion

The role of engineering in the delivery of the gas value chain in Nigeria has been highlighted in this article as being very critical and pivotal to all activities in the three level gas sectors (upstream, midstream and downstream) that make up the gas value chain. No doubt, engineering is fundamental for planning, design, construction, implementation and operation of any and every infrastructure required for efficient delivery of the gas value chain in Nigeria. One can therefore conclude without gain saying that engineering is the ***'strong chain'*** that drives the delivery of the gas value chain in Nigeria. This is however without prejudice to the critical role of financial investment that make the whole process of delivery of the gas value chain effective. In reality, while engineering is the ***'strong chain',*** financial investment is the ***appropriate lubricant*** that makes the chain run smoothly for the delivery of gas value chain in Nigeria.

Why FG Must Prioritise Professional Appointments in Key Leadership Roles

- NSE President

The President of Nigerian Society of Engineers (NSE), Engr. Margaret Aina Oguntala, FNSE who recently marked one year in office, explains to Engr. Laura Uhiara how the Society's collaboration with various organisations will go a long way in opening pathways for local manufacturing, job creation and increased productivity, especially for the country's young people in sectors like agriculture, technology and infrastructure. She also states why it is imperative for the federal government to consider appointment of qualified professionals for key leadership roles, especially in the management/boards of the River Basin Development Authorities, as well as other engineering positions in Ministries, Departments and Agencies

The Nigerian Society of Engineers (NSE), recently signed an MoU with Assetrise, Lancaster Farms, Techlytics and BHM. How does this collaboration align with NSE's long-term vision for Nigeria's engineering industry and the nation as a whole?

Thank you for this question, I would like to inform you that we came on board with a strategic agenda to address the pressing needs of the engineering industry and community in the country. The agenda is carried on five pillars which include Membership Development, Improving Intergovernmental/Industry/Academia Collaborations, Re-enforcing International Relations Mechanisms, Re-imaging the NSE for Enhanced Publicity and Governance Structure and Improving Community Impact. It is part of the effort at achieving this overall objective that we recently signed the Memorandum of Understanding (MoUs) with Assetrise, Lancaster Farms, Techlytics, and the Black House Media (BHM).

Partners like the tech-centric Techlytics and Assetrise limited provide platforms for upskilling Engineers in data-driven decision-making, smart technologies, and

sustainable practices. Therefore, with their assistance we will ensure that our Engineers are well-equipped to tackle both present and future challenges. Lancaster Farms' expertise in agriculture complements NSE's vision for sustainable engineering solutions covering food production and rural development. We believe that the collaboration can lead to innovative approaches in smart farming, irrigation systems, and renewable energy solutions, all of which are essential for achieving the United Nations Sustainable Development Goals (SDGs). We plan to establish Demonstration Farms and Engineering Villages across the six geo-political zones, enabling our Engineers to apply their expertise in mechanized farming, irrigation systems, and sustainable agricultural practices. These hubs will not only centralize cutting-edge equipment for optimal resource use but also serve as innovation incubators where new agricultural technologies can be developed and tested.

These collaborations we are talking about will go a long way to open pathways for local manufacturing, job creation, and increased productivity in sectors like agriculture, technology, and infrastructure. This aligns with NSE's goal of leveraging engineering expertise to catalyse Nigeria's economic diversification and reduce reliance on imports. This move also supports NSE's commitment to community engineering initiatives by ensuring that projects have a direct and positive impact on Nigerians, particularly at the grassroots level. The Black House Media (BHM) on the other hand will amplify these efforts through strategic communication and advocacy, ensuring that the benefits reach all stakeholders.

Again, these collaborations underpin NSE's vision of being a leader in transforming Nigeria into a country driven by sustainable engineering solutions. By integrating expertise from these partners, NSE would strengthen its capacity to address developmental challenges and position the engineering profession as a critical driver of national progress.

What specific benefits will the Engineers gain from these collaborations?

The collaboration with our partners here mentioned offers a range of tangible benefits for our Engineers. I wish to inform you at this point that besides, we also have other partners that we do not have MoUs with but are working with us in the direction of our vision. They include; Kenol Nigeria Limited, Coleman Technical Company Limited, Protogy Global Services Limited, LEE Engineering, Total Energies, NASENI, Energy Commission of Nigeria Dynamic Power Construction Company Limited among others, we are indeed grateful to all them. In collaboration with them, Our Professional Development Department and Techlytics have successfully carried out a training on Data Analytics and Software Development which Two Hundred and Seventy-Nine (279) Young Engineers benefitted. Earlier, under similar collaborative window, we launched a training on Ethical Hacking and Cyber Security for Six Hundred (600) Young Engineers across the Six (6) geopolitical zones of the country, this was done jointly with the Nigerian Contend Development Monitoring Board (NCDMB).

Under the same form of arrangement, we have held a Mini Workshop on Smart Farming with our partners, the International Standards Organisation (ISO). The workshop provided the Young Engineers a unique opportunity for all of them to further develop expertise and expand knowledge, equipping them to contribute to our country's agricultural transformation.

Let me inform you that our strategic agenda includes a robust Entrepreneurship Development Programme designed to enhance the agricultural sector's productivity and innovation. By equipping our Engineers with entrepreneurial skills, we aim to revolutionise agri-businesses through advanced engineering solutions.

We plan to establish Demonstration Farms and Engineering Villages across the six geo-political zones, enabling our engineers to apply their expertise in mechanised farming, irrigation systems, and sustainable agricultural practices. These hubs will not only centralise cutting-edge equipment for optimal resource use but also serve as innovation incubators where new agricultural technologies can be developed and tested.

These trainings, as I have explained are planned to enrich knowledge and also empower our Engineers. The NSE remains committed to fostering professional development initiatives that will enhance the employability and entrepreneurial capacity of our members, particularly our Young Engineers.

What role does the NSE play in supporting the development of sustainable infrastructure in the country?

The Nigerian Society of Engineers plays a crucial role in supporting the development of sustainable infrastructure through various initiatives and activities. As a first step, we promote initiatives to boost the skills of workers on projects in different sectors. For example, our collaborations with the federal government in which we highlighted the importance of a specialised training institute for the power sector, immediately led to the establishment of the National Power Training Institute

of Nigeria (NAPTIN).

Our Engineers provided expertise and technical support during the planning and establishment of NAPTIN, ensuring that the institute's curriculum and training programmes meet industry standards. We also followed up to ensure that the training programmes incorporate industry standards and practices, preparing trainees for real-world challenges in view of the cruciality of the sector to the economy.

NSE organises regular workshops and seminars focusing on the latest technologies and best practices. We collaborate with universities to develop specialised courses and curricula that align with industry needs. Through partnerships, we facilitate internship opportunities for engineering students, providing hands-on experience in the respective sectors. This is yet, another long-term approach to the delivery on infrastructure by our would-be professionals. Our Continuous Professional Development (CPD), is also a veritable platform for our members who regularly update their knowledge and skills. We have the Mentorship Programmes, on which we deploy our Fellows who are experienced Engineers to impart knowledge to the younger professionals, helping them navigate their careers and enhance their skills.

We also work with regulatory bodies to establish standards that ensure high-quality engineering practices. We encourage research and development thereby promoting innovative solutions to industry challenges. We host technical sessions in our conferences where Engineers can share knowledge and innovations related to specific sectors.

We collaborate with companies to design training programs tailored to industry needs. NSE organises parleys where Engineers, industry leaders, and policymakers can discuss and address sector-specific issues. These initiatives are aimed at ensuring that our Engineers are well-equipped with the necessary skills and knowledge to contribute effectively to our country's infrastructure needs.

You are aware that as a country we are grappling with the menace of the deployment of inferior materials and cutting of corners by some notorious clients, contractors and property developers which leads to eventual collapse of infrastructure. The factors behind the collapse of buildings, particularly, residential and commercial complexes are numerous. However, there are extant laws meant to checkmate these unfortunate occurrences.

In 2019, we pushed and the Engineers Registration Amendment Act was affected to among other things address the menace of building collapse and other cases of engineering failure in the country. The amendments also strengthened the Council for the Regulation of Engineering in Nigeria (COREN); with far-reaching powers of prosecution of infractions, regulating industrial training of Engineers and capacity building for local content in the engineering industry. The law therefore grants COREN the power to prosecute any individual or body corporate that contravenes the provisions of the act in a court of competent jurisdiction.

In-spite of this, buildings have continued to collapse. Owners of buildings and quacks infiltrating the industry have continued brazenly with alteration of approved building plans or even embarking on construction of some buildings without approved plans. Again, poor maintenance culture and wrong use of structures has pervaded our polity. The issue of building collapse has therefore bedevilled our country at the expense of precious lives.

Aware of the inefficiency of the building regulatory agencies or conflicts among the professionals in the industry, the Nigerian Society of Engineers in 2013, took the bold step by galvanising the sector players by initiating discussions on sanitising the built environment at the level of Presidents and Registrars of the concerned bodies. The idea is for us to meticulously pursue the observance of the necessary rules guiding infrastructural development in our country in all ramifications. Similarly, knowledge exchange and technology domestication is top on our agenda.

We have taken these steps because, the very essence of the establishment of our respective Societies and Associations is for the advancement of the practice which, in itself, has critical control measures embedded in order to sufficiently uphold the dignity of practitioners and the professions. NSE will continue to lead the pack of professionals to continue to do this until we experience sanity in the industry.

The roles played by our members in the Nigerian economy cannot be over emphasised. The available road networks and buildings amongst other critical infrastructure across the country lay credence to this assertion. Consequently, we cannot fold our hands and see disruptions that are destructive go on unabated. The rascality of imposters who have invaded the profession has impugned on our dignity and image of our profession for too long and cannot be tolerated again.

What is your view about the federal government's recent appointment of executive officers who lack the requisite credentials and qualifications into critical engineering positions of the River Basin Development Authority (RBDA) and what does it portend to the

development of the country?

Again, let me here remind you that our spontaneous reaction on this matter when the federal government announced the appointments is part of our effort in supporting the development of sustainable infrastructure in the country. The River Basin Development Authorities as is well known play very important role in ensuring the efficient administration and equitable distribution of our nation's water resources, which are essential for agricultural productivity, environmental sustainability and economic growth. It is vital that these Authorities are overseen by individuals who possess both the technical expertise and professional qualifications required to navigate the complex engineering challenges of the industry. The appointment of personnel without the requisite engineering qualifications undermines the integrity of these institutions and jeopardises the ability to fulfil their mandates effectively.

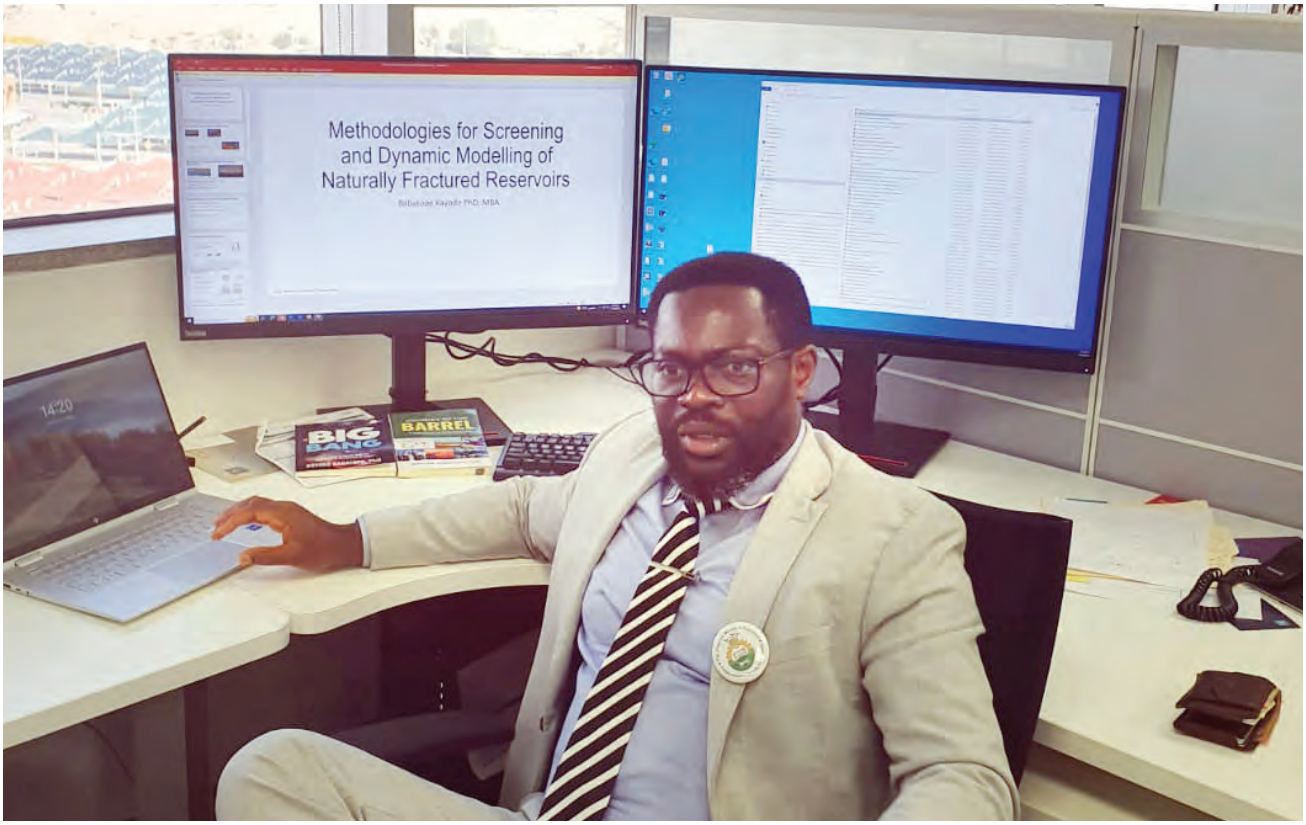
Having carefully reviewed the composition of the various RBDA boards, the Council of the Nigerian Society of Engineers (NSE) noticed that many of the appointees assigned to manage the critical engineering positions, namely – Executive Director, Engineering and Executive Director, Planning and Design – lack the necessary qualifications and professional credentials. Our findings also revealed that only five (5) of the appointments were allotted to Engineers as Executive Directors.

We have already pointed out this through a protest letter to Asiwaju Bola Ahmed Tinubu, GCFR, the President and Commander-in-Chief of the Armed Forces Federal Republic of Nigeria expressing our concerns which are genuine regarding the implications of these appointments for the future of Nigeria's water resources management and sustainable development.

The Nigerian Society of Engineers urges the Federal Government to reconsider these appointments and adhere to established guidelines that ensure the appointment of qualified professionals for key leadership roles. We advocate for consultations in the appointment process and the necessity of qualified Engineers who possess the relevant degrees and professional accreditation to occupy the positions of Executive Director, Engineering and Executive Director, Planning and Design in the management/ boards to oversee the vital departments in the River Basin Development Authorities as well as other engineering positions in Ministries, Departments and Agencies (MDAs).

Nigeria Needs Extensive Pipeline Transportation to Unlock Huge Gas Reserves

– *Engr. Dr. Babatope Kayode, MNSE*



Engr. Babatope Kayode, MNSE, *is a Petroleum Engineering Specialist at Saudi Aramco, the National Oil Company in Saudi Arabia. He shares his insights on pipeline technology for gas transportation in this interview with Engr. Dr. Abdullahi Mas'ud, MNSE.*

With your extensive experience in reservoir engineering, how would you assess Nigeria's current gas value chain, and what are the key engineering challenges that needs to be addressed for its optimization?

Nigeria's gas value chain encompasses upstream and downstream sectors. Upstream utilization includes secondary and tertiary recovery, and downstream utilization includes industrial or domestic power generation, cooking, and, more recently, transportation.

Nigeria has significantly larger reserves of non-associated gas than it has associated gas. However, Nigeria's current gas production is mainly from associated gas.

The key challenges for developing non-associated gas are its economic viability due to its low cost, demand (which has recently increased), and, most importantly, its transportation. Gas cannot be stored in tanks the way oil is; hence, to develop a gas field, pipelines taking the gas to market must be in place.

No single gas field could economically justify the long stretch of pipelines and security needed to take this produced fluid to market. The 3-tier approach currently used in the electricity sector may be required.

Tier 1 Petroleum and Gas companies use reservoir engineering to bring the gas to the surface. Tier 2 is pipeline companies that receive the gas from several operators and deliver to critical market locations, and Tier 3 represents local retailers that distribute gas to their customers.

In summary, the engineering solution that would unlock our nation's gas value chain is an extensive network of transportation pipelines, which non-oil and gas companies would more efficiently operate.

Nigeria has significant gas reserves, yet flaring remains a challenge. What engineering solutions can be deployed to enhance gas capture, utilization, and monetization in the country?

The several Liquified Natural Gas (LNG) trains in operation in the country are a significant step towards monetization.

Despite this monetization opportunity, flaring is still ongoing because of the same problem of pipeline transportation. Nigeria current produces associated gas; hence, the production facilities are designed principally for oil. Capture and monetization of gas can be enhanced by developing an independent network of gas transport pipelines.

For example, as part of its flare reduction strategy, Total Exploration and Production Nig. Ltd (TEPNG) completed the Obite-Ubeta-Rumuji (OUR) pipeline in 2016, enabling it to increase its supply of hitherto flared natural gas to NLNG from onshore fields such as Obite, Ibewa, and Obagi and offshore platforms like Amenam and Akpo.

Hence, the engineering solution for increased capture, utilization, and monetization is an extensive network of gas transportation pipelines that enable other uses, such as power generation, household cooking, and heating/cooling, vehicular mobility, in addition to the present focus on LNG.

LNG projects are a mere stop gap in the downstream Natural gas value chain. In the absence of an extensive pipeline infrastructure to transport the natural gas directly to end-users, operators have created a limited transportation pipeline, to take the gas to a processing plant where it is liquified and bottle for sale. The limited capacity of LNG trains cannot spur investment and development of non-associated gas reservoirs.

Gas capture, utilization and monetization would grow in proportion to the transportation pipeline coverage. An important question though is, should investment in pipeline infrastructure follow proven demands, or should the pipeline infrastructure investment be carried out as a driver for market demand. In my opinion, the later would take us much faster towards improved monetization of natural gas resources. For example, the infrastructure for mobile telephony came while we were all living with our analogue phones, suddenly we realized how we couldn't live without a mobile phone. The availability of the technology spurred its demand. In the same vein, we had separate gadgets for phone and photography until smart phone came along and immediately created a market for itself. In many cases, availability drives adoptability.

Given your background in CCUS (Carbon Capture, Utilization, and Storage), how feasible is it to integrate CCUS technology into Nigeria's gas value chain to enhance sustainability?

Over 60% of Africa's CO_2 emissions are due to just three countries: South Africa, Egypt, and Algeria. For perspective, while South Africa produces about 400 million tons annually, Nigeria produces about 100 million tons annually, and China is the highest producer at 13,500 million tons annually.

Most companies and countries that carry out CCUS extract CO_2 from the atmosphere for storage in aquifers or depleted oil reservoirs. This is a self-penalty that allows operations to continue with related CO_2 emissions. That is why it is called Net Zero emissions. They permit their operations to continue with associated emissions but go to the atmosphere to extract CO_2 for storage, compensating for their emissions.

In light of our relatively insignificant contribution to CO2 emission, I would suggest the country divert available resources towards the development of an extensive network of gas transport pipelines; more jobs would be created, there would be enhanced utilization and monetization of associated gas, and an opportunity to unlock national wealth through the development of non-associated gas reserves.

CCUS is an excellent subject to be aware of and keep in our national discourse, but to enhance sustainability, a lower-hanging fruit for our nation is to zero the flaring of natural gas through its capture and utilization by deepening our gas pipeline coverage.

As someone who has worked with Total Energies and currently with Saudi Arabia's ARAMCO, what engineering lessons from international gas projects can be applied to improve Nigeria's gas infrastructure and operations?

In France, almost all homes are connected to gas supply lines for cooking and heating. When household heating demand is reduced in the summer, a gas storage project in underground reservoirs is carried out. This stored gas is produced in winter to complement the contract volumes and satisfy the higher winter heating demands. I was involved in the reservoir engineering aspect of such a project while working with Total Energies in Pau, France.

Saudi Arabia is now massively exploring non-associated gas for domestic consumption, with the government announcing two significant discoveries.

Saudi Aramco, a major player within the Kingdom, recently announced an internal reorganization to create a new Gas Development entity to enable the focus on gas exploration and development. Based on my experience, I'm involved in the reservoir engineering aspects of underground storage during periods of reduced household demand, which occurs in winter.

Summer is the peak of household demand here due to the need for air conditioning. As seen in the Saudi Arabia example, domestic gas utilization is fueling the growth of non-associated gas exploration and exploitation.

Nigeria is shifting towards gas as a transition fuel. What role does reservoir simulation and modeling play in optimizing gas field development and production?

Reservoir modeling involves using data acquired from a reservoir to build its prototype. Then, utilizing the applicable physics of flow in porous media, reservoir simulation forecasts the production profile and reserves associated with various development scenarios, including well count, rates, spacing, and type.

By estimating the reserves associated with several development plans, we can determine the optimum and construct optimized surface facilities that meet expectations and reduce slack.

In fact reservoir simulation and modeling can be likened to the present-day industry buzzword 'Digital Twin', in which a prototype represents a physical system. The prototype is utilized for descriptive and diagnostic monitoring of the actual system as well as for predictive and prescriptive assessment. Reservoir simulation provides the data required for optimum reservoir development and management decisions.

Pipeline integrity and security remains a major issue in Nigeria's gas transportation network. From an engineering standpoint, what advanced technologies or methodologies can help mitigate these challenges?

The challenge with Nigeria is not the absence of technologies but rather the lack of investments and enabling policies. There are industry technologies for instant leak and theft detection. Using an Extended Real-Time Transient Model, the KROHNE PipePatrol, for example, can give an alarm and provide the rate and location of a pipeline leak. It can be deployed within a new project or retrofitted into existing pipelines.

PipePatrol Theft Detection uses dedicated pattern recognition to provide fast and reliable identification and localization of unauthorized or illegal product discharges, typically theft. Even for small volumes, the system initiates an alarm within minutes, making it possible to stop theft in the act. To alert the relevant staff, the system provides alarm reporting via e-mail, accompanied by Google Earth integration showing the theft location, enabling a field team to take coordinated and swift action.

Technologies exist for pipeline integrity and security monitoring; the question is, who will put down the investment money? No hydrocarbon asset is large enough to justify an operator investing in a gas transportation pipeline economically; the county has to do that or create policies encouraging individual investors. Oil and gas operators can develop and produce gas reservoirs directly into independently operated pipelines. An independent investor with the right policies and business environments would be willing to invest in leakage and security technologies to ensure the integrity of his business assets.

The expansion of Nigeria's domestic gas market requires significant investment in processing and distribution. What key engineering innovations can make gas processing and distribution more efficient and cost-effective?

Nigerian Gas Company Limited (NGC) is a Nigerian National Petroleum Corporation (NNPC) subsidiary. It is responsible for transporting and marketing natural gas across Nigeria.

The Nigerian Gas Processing and Transportation Company (NGPTC) owns the main natural gas pipeline transportation infrastructure in Nigeria: the Alakiri–Obigbo–Ikot Abasi Pipeline (the Eastern Network), the Escravos–Lagos Pipeline System (the Western Network), and the proposed Ajaokuta–Kaduna–Kano gas pipeline connecting the North.

The NGPTC has granted franchises to private parties such as Shell Nigeria Gas, Gaslink Nigeria Limited, and Falcon Corporation Limited to develop gas distribution infrastructure in specified markets on a build, own, operate, and transfer basis. Other natural gas distributors and marketers currently operating in the country include Gas Network Services Limited, Central Horizon Gas Company, Transit Gas Nigeria Limited, and Axxela.

However, these companies' current focus is on industrial and manufacturing complexes. The household market is not yet served. Similar to how each building in a neighborhood is easily connected to an electrical power supply line, the gas supply network needs investment to be deep enough so that each building can be connected by pipeline to natural gas supply for home cooking.

Unlocking household usage would strengthen the economics of exploration and exploitation of non-associated gas and bring about national wealth. A deepened domestic market would also reduce the need to liquefy our natural gas for export.

Such a required network of pipelines requires sound engineering design to avoid jamming and rough terrains. AI can intelligently route pipes along optimal paths while ensuring adherence to design specifications, identifying and resolving collisions and clashes, and precisely modeling the connections between components. AI-driven piping design solutions can significantly reduce the time required for the engineering design phases of such pipeline projects.

As a reservoir engineer with expertise in AI and automation, how can digital technologies such as AI, data analytics, and automation improve

decision-making in Nigeria's gas industry?

Enhanced decision-making is hinged on enlightenment. AI and data analytics convert data to information at such velocity, variety, and depth, which is impossible from manual data analysis.

In the upstream gas sector, various data, such as seismic data, drilling data, frack performance data, production rates, etc., are used. Analyzing these data allows the oil and gas industry to optimize its processes. In my experience, I have witnessed the operation of trained AI systems, predicting well logs with reasonable accuracy to eliminate the actual acquisition of such logs and thereby constituting cost savings. AI has been successfully deployed in the industry to record operational data using the concept of computer vision.

In the past, data gaps could exist in the information record because of the unavailability of the responsible field personnel or due to bad weather like rain, storms, or excessive heat, making it unsafe for the site personnel to take the readings. Today, using computer vision, permanent AI infrastructure on-site provides continuous and unbroken data records, enabling more robust decision-making.

Two of my publications (SPE-214476-MS, SPE-212605-MS) address the use of an AI pattern recognition algorithm to model the subsurface heterogeneity responsible for the observed patterns in wells' historical time-lapse pressures, ultimately helping in deciding how to optimize recovery.

Another of my works (IPTC-23929-MS) addresses the application of Automatic Well Placement Logic in numerical reservoir simulation to optimize the types, locations, and spacing of wells to enable optimal recovery.

Downstream, the oil and gas industry is progressively adopting advanced AI technologies. Key trends include Digital Twins, a virtual equipment model for real-time monitoring and efficiency improvements. Also, by analyzing energy usage patterns, AI algorithms can identify energy-saving opportunities, recommend energy-efficient operating strategies, and provide real-time energy management insights, helping refineries and petrochemical plants minimize their environmental footprint and improve sustainability.

Effective decision-making requires insight from data; AI provides these insights.

Gas-to-power projects are crucial for Nigeria's energy security. What strategies can be employed to ensure stable gas supply for power generation in the country?

Natural gas accounted for approximately 75% of the power generated on the national grid in 2023. With 200 trillion cubic feet of proven natural gas resources, the natural gas industry is set to contribute even further to power generation in the near future.

The high electricity tariff and the unstable nature of the grid's power supply have made gas plants far more attractive for manufacturers, cutting downtime, emissions, and operating costs.

Some manufacturing outfits source gas through a piped gas line from major gas suppliers, but they still use bottled gas (CNG) as a backup gas supply to avoid disruptions due to power outages during periods of low gas supply from major suppliers.

Investment in developing the nation's massive non-associated gas reserve could stop the tide of insufficient gas supply for gas-to-power projects.

10. With Nigeria's commitment to net-zero emissions by 2060, how can engineering solutions balance increased gas production with environmental sustainability?

Zeroing in on gas flaring is the most significant step towards a future of net-zero GHG emissions. The field developments in Nigeria today are predominantly oil with associated gas. Hence, the oil is the focus, and the gas is an impurity that must be removed. To monetize the gas, there must be a market for it, which is not a problem today, but to get the gas to market, there must be a vast pipeline network.

Engineering companies undertaking such projects are available; the question is who pays for the investment.

The Bonny NLNG is an independent company formed as a joint venture between the nation and a consortium of major oil and gas producers. The company constructs and maintains a network of pipelines to receive natural gas from producers, which it liquifies for export.

Environmental sustainability in Nigeria's gas sector is not so much a search for engineering solutions as government policies to facilitate the construction of gas transport pipelines. This will send gas flaring to near zero and initiate a race towards exploration for non-associated gas, creating jobs and national wealth.

We are the champions of local content, proving to people that Nigerians are good Engineers

– Engr. Georf Onuoha, FNSE

Engr. Georf Onuoha, FNSE *is the Chairman/CEO, B. G. Technical Limited, one the leading Nigerian companies that provide Pipeline and Process Services which include Hydro Testing, Upstream Chemical and Facility Cleaning, Inline Inspection, Dewatering, Baseline Survey and other allied services. In this interview, he spoke with Engr. Dr. Felicia Agubata, FNSE and Henry Iortim on various subjects around the Role of Engineering in Delivering Gas Value Chain in Nigeria.*

How has your professional journey influenced your approach to engineering solutions in Nigeria's gas value chain?

Thank you very much for this opportunity to host you here and talk about what we do. I have a wide experience nationally and internationally and I have been in the oil and gas industry for thirty-plus years and I have seen the path of technology in the oil and gas chain. I have seen areas that look like they don't have a future and engineering innovation comes in and transforms everything. That is the approach that we bring into B. G. Technical. We look at the things that engineering innovation and development can do to improve what we deliver; approaches using engineering, applying it and using it to make things work better achieve result, and to deliver products. and If you follow the trajectory of our company, B. G. Technical as this interview goes on you will see that from where we started just doing small service work we went on into engineering innovation and to manufacturing. We went to software development, proprietary software development, we went to technology development and we moved onto technology ownership and to delivery services for globally. So, my vision is that engineering is key to drive all these things.

What key contributions have your company (B.G Technical Ltd and Affiliates) and Pipeline Pigging Products & Accessories (PPA) made to the Nigerian gas industry, particularly in pipeline integrity and maintenance?

Yes, you have to understand first of all that there will be no gas industry without pipelines. So, pipelines are key and central You can do a comparison between gas and oil which is liquid. You can put oil in a tanker, put it in a barge and transport it. Now, if you are producing gas, you cannot

put it into a tanker, it has to pass through a pipeline at some point to go to where ever you are going to do the first level processing, cleaning it up or bottling it up or compressing or cooling it for transportation. So, working on the pipeline infrastructure is key, it is fundamental to gas development. What have we done in that area? Our company, has led in the area of maintenance of pipelines, placement of pipelines, and assuring the value chain for pipelines. For example, we are the only company in West Africa that manufactures pipelines cleaning pigs and these are products needed them to maintain those pipelines, to avoid corrosion and damage. We have developed technology that monitors corrosion and assures the integrity of pipelines in Nigeria. We have developed the products that are used for security for protection of the physical access, and we have been involved in software for pipeline integrity monitoring. We have developed some of these software in-house using Nigerians looking inwardly. We are the champions of local content. Remember also that it is our work that has brought me to be the co-founder and currently the chairman of the Association of Pipeline Professional Association of Nigeria. So, you can see the value we have brought to gas infrastructure, because there would be no gas without pipelines.

Engr. Onuoha

How does your company ensure compliance with global engineering standards while addressing Nigeria's unique gas processing and transportation challenges?

You know, when you have pipelines, they are in the ground in an environment; they are something you probably don't see all the time. But they are there and it is important that they operate in compliance to the highest industry standards. So, having them cleaned limits corrosion, preventing leakages, preventing dispersal from the vessels into the environment. Secondly, when we push things out of pipelines we do waste treatment and waste management. We ensure that aspect is done right. We have what we do in our company, a program we call "always ready to show". What that means is that, where ever we work in our office or in the field we are at all times 'ready to show'. If you are coming to our fields where we work, we are not going to be running around to clean, so we make sure to in compliance at all times, we must keep the place tidy, we must care for the environment, we must use bio-degradable materials and chemicals. We build those things into the fabric of our work. So, we are very conscious of our environment. Part of our commitment is to ensure that this industry, this blessing that we have in this country, that we use it in a way that doesn't harm us, doesn't harm our environment and stays there for our children coming thereafter. We are intentional and we kind of build it with our people. We are always ready to show. That is the culture we try to build into our system.

Mention innovative engineering solutions your company implements to enhance the safety and efficiency of gas transportation?

Listen, one thing about pipelines, especially for gas; a pipeline actually is a pressure system, a closed pressure system that is a marvelous engineering piece. You are taking a whole large engineering piece with a large foot-print crossing miles and are putting pressure in it and bottling up. Pressures up to 60 bars is a lot of pressure. Now if you suddenly expose that 60 bars to the environment, it would explode and take away a whole wide area. So, you can see the risk that is there. Our job in the integrity assurance, and integrity management is to make sure that these engineering pieces meet the integrity that is specified so that the risks of explosion, of mishap, of environmental damage are minimised. So, these are the risks and these are the reasons we do our work. We tell customers the conditions and the status of their pipelines and also how much life might be left in that pipeline and how many more years they can expect to draw life out of it considering how they are operating the pipeline. So, our work factors in very much to managing all the risks and potential exposures from using these engineering pieces.

How does your company

balance environmental sustainability with Nigeria's growing demand for gas infrastructure development?

You know when we talk about gas, I always like to come back to the infrastructure that is used to manage gas or the process facilities where we work to because there are these compressors, meters, gas filtrations systems all these other things. Our services go across that whole value chain. The leadership we bring into it, has impacted a lot in the process. Now I can tell you when we engage with the operators and the infrastructure owners we introduce new techniques and new processes for doing things. We have introduced the processes of monitoring the work that is done. We use cameras, computer records, and our software to keep proper records which are part of the pipeline integrity management process. So, young operator companies that cannot afford elaborate in house systems to do their systems integrity management rely on us. They rely on our records, they rely on the information we provide and they come to us to guide them to put systems in place. We are impacting that whole chain and showing leadership. We also sponsor a number of service companies that emulate what we do and provide services in the sector. They learn from us and they provide related service. You see that the companies we work for soon enough start adopting processes that we bring into our work and they become part of their own system. We help them put up their tendering. Quite often, we see our terminologies, and wordings in what they give out to everybody else. So, our foot-print is there in some of the tenders and processes out there, taken from what we have put out when we get called to help with ideas. One other thing we are doing, is that we are proving to people that Nigerians

Engr. Onuoha

are good Engineers. Personally, I was a Manager, a Developing Engineer a District Manager at Schlumberger. I worked internationally, I managed processes in France, Italy, in the United State of America, I was a Geo-Market Manager of a segment for Schlumberger in the USA. I ask, if I can do these out there why can't I do them here? That is one thing that impacts our thought process. We believe Nigerian engineers can succeed outside and also in Nigeria. So, the products we design in our factory, are used in other places around the world. Our vision in the next few years, is that some of the inline inspections and integrity management analysis we offer around the world would be processed in Nigeria by Nigerians and sent out internationally. We already started to put the system in place so, it is going to happen.

What technological advancements do you see shaping the future of gas infrastructure in Nigeria, and how is your company adapting?

So, there are so many things you can see that are going to happen, to technology in terms of software applications and data management. Data is a very big thing, in our job we collect a huge amount of data. So, all the systems for data cleaning, for data mining, AI related things are relevant. We are already looking at how those would help us better manage the data we collect for integrity; from acquisitions and from measurements, using improved computer systems to optimize all the data volumes that we handle. One small example; when we do a pipeline inspection, we collect data in terabytes. Embedded inside there is a lot of information. Information on the damage, information on the type of material, information on the aging process, corrosion process, there is information on taps, on external intervention. One has to go into that data stack to extract these information. It is elaborate and time consuming. That is why finishing one system work could take two to three months to final result. Also, we have analysts looking painstakingly at data. So we are hoping that the new AI (Artificial Intelligence) data analysis system will help us fast-track this process, optimize things so that we can pull out information quickly and get to people who have to use it. We hope that AI will help us develop new engineering products, new inspection methodologies, the new monitoring systems, for pipes, compressors or floating systems. it is very exciting

prospect and my vision is that Nigerians must be part of it. Our Engineers are good, Nigerian Engineers are, trust me. They need exposure, they need training they need guidance and most importantly, they need confidence. I assure them always that they are as good as anybody elsewhere. I have seen them at work, I have seen it in our Young Engineers. When we started, we had partnerships, and for every little thing we needed we ran outside the country. Now we are at a place where our Engineers would tackle any challenge and come up with a design or engineered solution. We have people coming from outside Nigeria, and other parts of the would to take our products, and to take our designs. That is a powerful testament.

What advice would you give to Young Engineers looking to make an impact in Nigeria's gas industry, based on your experience and the work your company is doing?

Here is the first advice I give to Young Engineers always: I remind them, "when you start going to school to pursue your education from primary school to the university, you or your parents paid for somebody to teach you. The very moment you come out of the university, regardless of your class of degree, your value to any employer at that moment is very little, and may be next to nothing. Because a Young Engineer out of school today does not bring any immediate value, or impact on the revenue or profitability of her employer, maybe for the next one year until she has learnt something. They have to take the view " somebody is willing to pay me to learn something for the first six months or one year before I can be of value to them". So, for her, it is a wonderful and great opportunity. What would she do with it? first, is to learn, you have to hunker down, forget the money, forget everything else. Learn and improve on yourself to be better. Look for how you can contribute and change things. Now after you have done this for one year or two years, you would acquire some skill that you can market and apply elsewhere or to new positions. So, I say learn, know what is out there, and then get yourself skilled. Luckily in the present world, so much more is possible unlike when we were growing up. Explore resources that are out there. Subscribe to AI Tutor and tell it you want to learn about the design of pipelines for example; pick any aspect or the structure, or what is a gas processing plant. It would coach you and you will add to the knowledge that you have acquired".

Middle: Vice President of NSE/Chairman Editorial Board of Nigerian Engineer Magazine, Engr. Dr. Felicia Nnenna Agubata, FNSE flanked on the Left by Engr. Onuoha and on the Right, Engr. Reginald Ibezim MNSE B.G Technical Limited, General Manager.

Engineers at work in B. G. Technical factory

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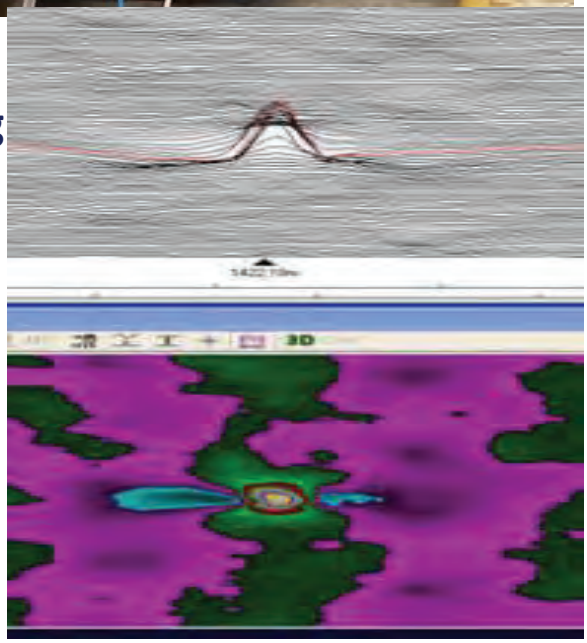

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FG laying resilient gas infrastructure across Nigeria

- Rt. Hon. Ekperikpe Ekpo

The Federal government is prioritizing the expansion of Nigeria's Gas infrastructure through various initiatives, Policies to ensure pipeline security and minimize gas flaring among others. The Honorable minister of Petroleum (Gas), Rt. Hon Ekperikpe Ekpo bares his mind on his ministry's strides in the sector to members of the Editorial Board led by Engr. Felicia Agubata PhD, FNSE and Engr. Lasisi Salami Lawal PhD, FNSE.

Hon. Minister, Sir, Engineering plays a critical role in expanding Nigeria's gas infrastructure. What are the Ministry's key initiatives to improve gas processing, transportation and storage facilities?

Key Initiatives in Gas Infrastructure: The Ministry is prioritizing the expansion of Nigeria's gas infrastructure through initiatives like the Nigerian Gas Transportation Network Code, Ajaokuta-Kaduna-Kano (AKK) pipeline project, OB3, Decade of Gas, NGEP, PICNG among other government incentives in the sector. These projects and Programs aim to enhance gas production, processing, transportation, and storage, leveraging on available engineering expertise in-country and other human capital resources and aligning with our renewed hope agenda for energy security and economic diversification.

Gas pipeline vandalism and leakages remain challenges in Nigeria. How is the Ministry ensuring the implementation of engineering best practices to enhance pipeline security and reliability?

Enhancing Pipeline Security: To address vandalism and leakages, we are implementing cutting-edge engineering solutions like real-time monitoring systems and automated surveillance to improve pipeline security and reliability. These efforts are part of our mission to ensure a resilient gas infrastructure. We are also collaborating with relevant engineering associations to ensure best practices are

Rt. Hon. Ekperikpe Ekpo

adhered to through applications of those cutting-edge technologies in securing our gas pipelines.

Despite policies to curb gas flaring, it remains an issue. What regulatory measures and engineering innovations are being adopted to enhance gas capture and utilization in order to make gas flaring in Nigeria a thing of the past?

Reducing Gas Flaring: We are enforcing stringent regulations and utilizing innovative technologies such as flare gas capture and mini-LNG plants to minimize flaring. Our renewed hope agenda supports these measures to transform flared gas into economic assets, promoting sustainable environmental practices. We ensure that all our regulators (NUPRC, NMDPRA, NCDMB etc) are working together to ensure the enforcement of our regulations and implementation of our policies in curbing gas flaring.

How is the Ministry leveraging modern engineering technologies such as AI, IoT and automation to optimize efficiency across the gas value chain?

Leveraging Modern Technologies: The Ministry is adopting AI, IoT, and automation to optimize operations across the gas value chain. These technologies enable real-time data analysis, predictive maintenance, and enhanced operational efficiency, contributing to the sustainable development goals outlined in our agenda.

Engineering expertise is crucial for gas sector growth. What policies are in place to train and develop local engineers for the future of Nigeria's gas industry?

Developing Local Engineering Talent: We are committed to developing local engineering expertise through initiatives like the Petroleum Technology Development Fund (PTDF) and Nigerian Content Development and Monitoring Board. These policies focus on training programs, scholarships, and partnerships with educational institutions locally and internationally to prepare a future-ready workforce.

How is the Ministry collaborating with private sector engineering firms and investors to develop and expand Nigeria's gas infrastructure?

Collaborating with Private Sectors: The Ministry actively collaborates with private sector firms through Public-Private Partnerships (PPPs) through NIES, NOG among others to attract investment and foreign expertise. Such partnerships are foundational to expanding our gas infrastructure, ensuring alignment with our agenda for infrastructural development and economic growth.

In the next decade, what major engineering advancements do you foresee shaping Nigeria's gas value chain, and how is the Ministry preparing for them?

Future Engineering Advancements: Over the next decade, advancements such as smart grid technology, carbon capture, and utilization systems, Blue, Green and White Hydrogen are poised to revolutionize Nigeria's gas value chain. The Ministry is investing in research and infrastructure upgrades to prepare for these innovations, ensuring they align with our national energy strategy and the renewed hope agenda.

During a tour of ongoing construction of Train 7 of the NLNG in Bonny, Rivers State.

Limited Infrastructure, Paucity of Funds Bane to Advanced Gas Development in Nigeria

- Acting Managing Director, Neconde Energy Limited, Engr. Chichi Emenike, FNSE

In this edition of the Nigerian Engineer magazine, we highlight the insights of Engr. Chichi Emenike, the Acting Managing Director of NECONDE Energy Limited. In a revealing interview with Engr. Dr. Felicia Nnenna Agubata, FNSE, the Vice President of the Nigerian Society of Engineers and Chairman of the Editorial Board, along with Assistant Director Media, Henry Terseer Iortim, Engr. Emenike shares her perspectives on the pivotal role of engineering in the delivery of the gas value chain in Nigeria. With the country's abundant gas resources and the growing demand for energy, the engineering sector stands as a crucial component in overcoming existing challenges and maximizing opportunities. The following excerpts from the interview provide invaluable insights into the strategies and innovations NECONDE Energy is implementing to enhance Nigeria's gas landscape.

Could you share with us a brief background of yourself and Neconde Energy Limited and the company's vision in Nigeria's gas value chain and how engineering drives this vision?

My name is Engr. Chichi Emenike, my Engineering background is in Chemical Engineering. I have worked within the Nigerian Oil and Gas industry for over 26 years and one of those who have been privileged to become an integrated experienced professional across the entire value chain, Up, Mid and Downstream. However, somewhere along the line in my career I went on to obtain a Master's Degree in Oil and Gas management from Robert Gordon University Aberdeen,

United Kingdom but then, as we use to say then in our MBA class whatever you read when you bring it back home here in Nigeria and internalize it. So, what has really helped my career over the years has been hands on experience. I guess it is part of my training and maybe in my DNA to be one who is pretty hardworking just to be able to get the kind of results that I seek to achieve. I am a member of Association of Professional Women Engineers of Nigeria (APWEN), I am founding member and the Vice President of Women in Energy Network, Upstream. I am also a very active member of Nigerian Gas Association (NGA) of which the Nigerian Gas industry and its happenings is a passion for me. At the NGA I have served on the Council for many years, from being Financial Secretary to Secretary General and most recently I was been elected as the 2nd Vice President. I am also the head of the Diversity, Equality and Inclusion Study group in that same Association. I started out my career in ExxonMobil and then moved on to other companies. Today I currently work in Neconde Energy Limited on OML42 as the Acting Managing director and Gas Assets Manager. Neconde is part of a large group of companies of which I joined about six (6) years ago. The first shot I was given was to take care of the Gas business and deliver value therein but I have moved on to take care of other parts of the business and it has been an interesting journey for me. Just to give background on our company, Neconde is a JV partner on OML 42. We own 45 percent and the Government owns through its Exploration and Production company NNPC E&P Limited (NEPL) owns 55 percent. OML42 is a producing asset, we produce crude Oil, we produce gas; we have supported the Domestic Gas market since 2018. The asset sits in the heart of the Niger Delta. It is an old Shell asset which we purchased about thirteen (13) years ago and since then the asset owners have worked together to jointly invest, develop and bring it up to speed. This has gone beyond just financing which is the big deal in the E&P business but it is also drawn down on real technical skills to be able to keep the asset going on till date.

Now this just a general blanket discussion as it relates to the part I am trying to highlight here, around indigenous players coming into the field. For a long time in the country we have always known the International Oil Companies (IOCs) like Shell, ExxonMobil, Total and the others, but today we have seen divestments that have happened. We have seen different indigenous players who have taken on plus others beginning to position themselves, for these assets and adding value constantly to stake/ shareholders.

Now this group has an interesting background story which I will like to highlight here. Our parent company started out as a general contractor and procurement outfit in the Oil and Gas space but over the years, the main driver has been tenacity, the quest for knowledge, the quest especially to prove that Nigerians can do well and do better in terms of local content and capacity building brought us to where we are today. The main owner who is not an Engineer moved on to do major work for companies like Shell and at a point in time the firm was even called the King of the Niger Delta swamp, arguably so, in the pipeline construction business. There were major projects that were executed and as those years rolled, they were done within the tenets of real service and quality delivery standards that are acceptable by the IOCs. The vision to do more also then took the company to when divestments begun and this asset was acquired. Since then, we have worked on bringing the asset back on stream and increasing our production levels. We have had and still have growth targets, KPIs which will see us doing some interventions, workovers and even drilling. Whilst we juggle Opex and Capex for different projects, engineering comes into action across the entire work that is being done. Engineering plays a huge part in our business. Doing cleaner energy has become a compelling business imperative even for outright sustainability and towards environmental stewardship and we are doing all we can on this asset to improve on this. Commercializing our Gas Resources is a big conversation; the whole idea is to reduce the carbon foot print across board. As

has been mentioned, OML42 has been supporting the Domestic Gas market since 2018 and we are strategically located near the Escravos Lagos Pipeline system (ELPS), which is where we plug in the Gas volumes to feed the domestic market.

What are the key engineering challenges facing the delivery of the gas value chain in Nigeria?

Natural gas is a wonderful source of energy; we will call it a transient energy; it is clean energy to a large extent and we have huge resources of it in the country. If you talk about proven reserves, we have over 209 TCF of Gas and unproven is anywhere around 600TCF. These volumes can even change the entire Africa energy story but the needle hasn't shifted significantly to create the much-needed turnaround. Whilst it is not all doom but we should have now been in a better place. The Gas value chain today in Nigeria still has a gamut of issues cutting across infrastructure constraints, pricing, lack of funding, technology etc. which all have a connection with engineering challenges. Some of the ways to look at this will be around the technical play along the value chain. A great part of these Gas that we are talking is still in the ground, so the first leg where our engineering comes into play is upstream development. Engineering is required working with the subsurface team to get these resources whilst maximizing economic recovery of the hydrocarbons from the reservoirs. Whether it is Non-Associated (NAG) or Associated Gas (AG) it requires a lot of technology, sub-surface understanding which impact your field economics and ultimately aids business decisions. In the case of AG, we now have laws against flaring even backed by the PIA, so you find a lot of companies doing what they can to be novel about creative solutions to find out what to do about the flare gas, a lot of engineering comes into play here too. Engineers are still grappling today with optimizing production amidst some of what I previously mentioned, aging infrastructure deficit, gas pricing, available financing. Gas is a little bit trickier compared to your normal crude oil development. So, with your Crude you drill and put it in your tanks; that is not the same with Gas. Gas has a value chain that requires, in my opinion, more engineering tactics end-to end. From coordinating the design of the well, the drilling itself, midstream and downstream infrastructure execution, it is an entire mix of engineering skills; end to end.

Now another critical thing about Gas is the commercial end which is why some people like us have gone beyond Engineering to understand the business side of discussions such as these. Before you make Gas development investment, the offtake must justify that investment meaning a viable bankable offtake has been secured and sits as the driver. In my opinion, sometimes the understanding from the technical end helps a great deal with the understanding of the technology that is required around that offtake market. Today, we have a lot ongoing in the country virtual pipeline space, whether mini-LNG or CNG, especially the latter. These are technologies that have been used elsewhere in the world for several years but we are catching up now, however, better late than never. Engineering underpins the entire technology, how you drill it, transport it under the right temperature and pressures, even the sort of pipelines (virtual or not) to be used.

There is need for more innovative technological solutions, in fact, engineers in Gas businesses need to leverage more on digital technologies to optimize resource allocation and even make data driven decisions.

In summary, the challenges are enormous but our approach is different. Here you find engineering at the very base of all these discussions; a perfect interplay; the thread that binds everything. However, Nigeria needs to focus more into transitioning into a fully competitive Gas market, strategically positioning itself in the Global Gas market place.

How has Neconde Energy ltd been addressing these engineering challenges?

Neconde is a JV partner and owner on OML42; we run this business with our partners. The asset which is an old Shell asset brought back on speed is producing in the heart

of the Niger Delta. The Asset provides a collection of high quality

identified prospects which we are working on as JV partners to exploit. We try to run our business as much as possible within the confines of the standards that the guide the industry and our business model is underpinned by value creation in a sustainable manner. For Gas infrastructure around AG, we already have an installed capacity of 80mscfd at our Central Processing Facility (CPF) we have been in the Domestic Gas market since 2018 and other infrastructure that are being worked on. With our JV partners, we are working on initiatives for our NAG volumes which are in excess of 3.8TCF.

The challenges in the industry today are not peculiar to us alone, whether it is the declining competitive edge for some time now which has been diminishing the country's attractiveness to international partnerships, financing, technological collaborations, and market expansion opportunities, we are dealing with these on a day to day as a business.

We have tried to adopt new technologies which is helping to improve efficiency, reduce costs, and enhance sustainability. We also try to have operations and maintenance contracts in place to help with process stability and uptime availability. Given that Upstream capital projects are dynamic with complex endeavours, Engineering for us has become to have a handle on the pressure on project teams with more speed where we can without increasing cost or compromising quality standards. There is still room for improvement for more proper asset management ensuring that resources are optimized, leading to greater profitability and sustainability in the long term. Note with some of these assets there needs to be technical consideration for natural decline in some of the mainstream oilfield reserves and the attendant the high investment capital in upstream exploration plus project development. We

have identified the need for use of various maintenance strategies, ranging from maintenance optimization strategies which has seen us try as much as possible to have the Original Equipment Manufacturers (OEMs) in place; to some cases where it may be outright reactive maintenance. The plan remains to do more of the former so we have less breakdowns which result in commercial implications. Maintenance is key for our performance, so whether you talk of guaranteed uptime, productivity, reliability, safety, regulatory statutory compliance, etc;it is all entwined and hinged on this factor. It remains an imperative to sustain production uptime as much as possible by ensuring the facilities are all kept healthy.

Can you highlight any innovative engineering solutions or technologies your firm has adopted to improve efficiency in gas production, processing and distribution?

So, I've mentioned that even for some of us that are operating today, we are dealing with old assets.

I will start from the infrastructure that we met on ground; some were harvested whilst some others we had to revitalize. We had to bring some of the Original Equipment Manufacturers (OEMs) to handle some of the equipment because the reliability and the availability of those machines are a big part of our performance trackers. We also try to have operations and maintenance contracts in place to help with process stability and even the safety of the operations. Safety in an industry such as ours should be always paramount, safety of lives, environment, even the safety of an investment ties to your Return on Investment (ROI) in this ball game.

We are also trying our hands on some clean Energy projects, mainly around carbon credit which today are not so popular in country. With some

of these discussions, in which international investors who are bringing in finance we will be exploring more recent technology and, in some cases, totally new Gas infrastructure. Some of these arrangements are looked at viz-a-viz the acceptability and the compatibility to the equipment we already have on ground as this is a going concern and live business.

Our engineers and indeed the whole team play a big part of this story of keeping the whole Asset whether in Crude or gas production alive. We appreciate them. Lest we forget, at its core, oil and gas production is a series of processes that requires expertise of extracting, separating, processing (of even water) and handlining these resources. And there is a capable team from both JV partners that oversee all these processes to deliver value.

From where you sit in the Gas industry today, how do you see Asset owners include Neconde Energy incorporating sustainability and green energy practices into their engineering processes within the gas sector?

I have touched on some of that earlier, some of these clean energy projects are where we are working with international interested parties to draw down on available financing targeted at carbon flare reduction and decarbonization. You know the clean energy talk is a big discussion today globally. As the world pushes towards net zero emissions, Africa and indeed Nigeria, is being encouraged despite our substantially untapped fossil fuel resources to key into this. Note that Africa alone, contributes only about 3% of global CO2 emissions and we need to look at if this is rather imposing constraints on our right to industrialize and increase our Energy Security. Personally, what i do propose is that Nigeria needs to get more selfish and targets its own growth, albeit using flexible methods to incorporate sustainability whilst leveraging on its fossil fuel resources. Nigeria has some unique dependencies on Oil revenue and whilst we must be a responsible country, we still must take this into cognizance. For us in our company, we are trying to accelerate our Crude oil production as well Gas in parallel.

Sustainability is a critical discussion in our industry today and it is for the long haul. Even some of the financing we try to attract recently, the due diligence involved has a leg in sustainability. The lenders want to ensure your level of social responsibility and impact in the area of operation is clear. For us as business stewards, the strategy here remains to balance maximizing the revenue growth whilst not running against the interests of other stakeholders especially in the host communities. It is very important to ingrain and practice the values of social responsibility because of what may be seen to be "competing agendas".

I will still re-emphasize that Gas to a great extent is a clean energy and is a perfect solution for any part of the value chain you can think of. Whether for power generation, or for virtual pipeline business CNG or LNG, Gas based Industries (GBIs). It plays a key role in contributing to economic growth through job creation and revenue generation.

Today we see in-country companies that are taking gas from Port Harcourt trucking it all the way to the North and other different regions in the country. Quite recently there were the

Ground breaking ceremonies for both CNG and mini-LNG projects in various zones across the country. From where we sit at the upstream end, we remain focused on work to bring more volumes to the surface in a clean and sustainable manner. More of these sorts of projects can be brought to life with further upstream Gas development and distribution.

Could you elaborate on how partnerships with other engineering firms, academia, or government agencies have influenced Neconde Energy's contributions to the gas industry?

The way business is today and in fact globally is that it makes sense to spread your risks, expand your war chest and optimize your resources with others to do more. For where we are situated as an asset today, we have other assets around us; some whom have existing infrastructure we could co-share with for commercializing both our AG and NAG volumes. Some of these require extensive economic modelling apart from the technical side of things. There is also a lot of interfacing with the various Government agencies and regulators especially from the engineering angle as it relates to approvals required as back up on the technical viability of either upgrading of existing infrastructure or outright new builds. We continue to appeal to the agencies and regulators to assist to create the enabling environment for the private sector to thrive. With the enhancement of the Petroleum Industry Act (PIA)2021, the Nigerian gas industry is in a transition from the old regulatory regime to a new one. Understanding the impact and implications of the current legal and regulatory framework is a big part of the discus.

Our JV partner NEPL is also part of the strategic thinking and partnerships; note that NNPC has stake in several other assets and sees the E&P business across board from different angles. The end game, is to optimize the resources with whatever available financing within a time frame. Do not forget that every OML is operating under a license that has a tenure; so, it has a life time. There is a statement I always make, which is 0 percent of 100 is 0 but 5 or 10 or 30 percent of 100 is a figure. That is where partnership comes in. Together we can do more; so, you sit down and map out who you are going to work with, who has the same standards/values or even better standards than you have? So, there are so many templates that can be ran with but what is important is who understands the market, who you are riding on the back of, -if you have to, who do you partner with that already has a leg in the Gas space. Players play at different parts of the value chain, whilst some is finance, for some it is technical, others it is a viable bankable Gas offtake market-the last mile man. Ultimately, the discussion around Exploration and Production of Gas business is a viable market. So, if we are going into the Domestic market, where do we plug into? How do we take this off? It is an entire discussion that has several moving parts that require different partnerships and engagements of all sorts.

Neconde and indeed NNPC are also members of the Nigerian Gas Association (NGA) where we have continued to advocate and push for strategic and technical partnerships even regulatory consultation in the industry; all in the bid to encourage the much-needed growth of the Gas industry.

How does the current regulatory environment impact engineering practices in the gas value chain, and what improvements would you advocate for?

So, let start from the PIA itself, this is a document that took us as a nation several years to pass. What we have today is a good document but it is also a rolling document. In my opinion, there are some things therein that are good, there some things that need to be further fine-tuned. With the enhancement of the Petroleum Industry Act (PIA)2021, understanding the impact and implications of the current legal and regulatory framework is a big part of the discus.

Even at Council where I sit at the NGA, we are still actively engaging at tables and in rooms to influence discussions related to

fiscal terms and the establishment of more transparent regulatory framework. There is a big part of the Gas discussion that is still impacted by the PIA today which we have always been advocating for and it is around the Gas pricing. The call for the need of the willing buyer and the willing seller (WBWS) situation; simply put- the Government needs to stop trying to regulate Gas prices. That is the only thing that will allow investments to flow in the way it should. I said earlier in our conversation every investor is giving you money and expecting it back plus profit. Now when you put a ceiling on pricing, it means you are telling me to walk backwards from the numbers you have given me and create a viable business. We all borrow from different sources, you don't know the constraints, you don't know what the lenders have put on the table. We need to let what happened in the GSM market happen here. When you allow different investors come in and infuse what needs to be done into the eco system you then begin to see market forces playing.

We need to reduce bureaucratic bottlenecks, simplify the regulatory processes thereby reducing costs and barriers to entry. The divestments going on now by the International Oil Companies (IOCs) is also creating opportunities for new Gas play. We need to be deliberate as a nation to attract the investments that are required to shift the needle, in terms of more Gas development and domestic Gas utilization. If our position will be enhanced in the global Energy market, we need to come across competitively and boost investor confidence.

As for the technology side, our engineering is good even though we can do better. We need to adopt more technological innovation and digitalization as these have increasingly become Global standards. There is a lot of Research and Development (R&D) going on globally churning out different technologies regularly within safety and quality standards. We have very good, smart, engineers in-country. Many of the IOCs work with a lot of Nigerians who are not retired yet and we see some of them are stepping into the indigenous companies who are buying these assets today and still delivering like they have in the past; so I have strong faith in the Nigerian Engineers-both old and upcoming. Some of the partnerships I spoke to earlier will help provide access to cutting edge technology and best practices that will help us build a more competitive and resilient Gas industry.

Could you share some of the key Corporate Social Responsibility (CSR) initiatives undertaken by Neconde Energy to support communities affected by gas exploration and production activities?

We don't separate the crude and gas business when it comes to CSR. There is an important part of the PIA that has kicked-off on OML 42 and that is the Host Community Trust Fund (HCTFs). We have six HCTFs and four have been inaugurated, the remaining two, the communities are still deciding on it internally. This is a process that is overseen by the Regulatory and now we are working on funding properly. Before this, we have been working with the host communities using other modalities and to some extent the relationship has been managed. We do a lot of community engagement as we realize, this is Nigeria for Nigerians and that is the reality of the environment where we work. We have workers also from the community. Apart from ensuring that our business continuity is intact it is also our commitment as a responsible company to our own Nigerian people. We are also

working to do better, some of the IOCs in the past made mistakes, we are trying not to repeat those mistakes. This is why we are working to ensure we put in place projects to reduce the carbon footprint massively.

What is your outlook for the gas value chain in Nigeria over the next decade, and how will Neconde Energy continue to play a transformative role through engineering?

Like I said the Gas story is one that I have been a part of for a long time. From the days where it was treated as secondary fuel, to where it has now been upheld for development as an identified key pillar of the nation's Energy strategy and security. I must say is not uhuru yet but is also a lot better from where we started from. If we are to drive investments that will honour more domestic gas obligations; we need to come to terms with real facts. The Gas pricing matter is still there. Like previously mentioned, I must commend the current Administration on some of its recent moves especially in terms of establishing full fiscal terms for deep offshore gas development which is targeted at improving the profitability of projects in that zone plus the other incentives to enable midstream Gas projects and reduce contracting timelines. There are some recent Gas projects of national interest that were signed off not too long ago, we want to see those projects now come on full stream. With this we get more jobs and the wheels of the GDP of the country turning probably faster. It will amaze you how much NLNG has contributed since inception to the GDP of this country. And we can work to have more of projects such as these. Nigeria should be able to service the entire Gulf of Guinea strongly so, cut across Togo, Ghana, all the way to Senegal, it is doable because energy security is a big discussion globally and we have the Resources. For as long as the world is growing in terms of population explosion the demand for energy is increasing. Some do not have the resources we have but they have been able to get very creative and even take ours and create a whole value chain. For us as a company and going concern, we will continue to try to increase our Gas volumes to the market in a sustainable manner. We would look at the possibility of playing in other parts of the Gas value chain, probably creating the integration that we see happening with some other players. All of these are geared towards supporting the Gas industry as a fuel that is integral in leading Nigeria's Energy transformation. We will continue the collaborations whether as a company or as members at the NGA (individual and corporate level). Quite recently, I facilitated an MOU between the NSE and the NGA which we are simply using as a platform to create awareness and educate the public on the benefit of domestic gas utilization and even creating opportunities for young females and professionals to gain practical experience in the Gas and Engineering sectors. There is more work to be done and people like us are committed to doing so.

Solewant Group has Furthered Development of Gas in Nigeria by Providing Critical Infrastructure & Creating Local Content

- GMD Solomon Ewanehi

Solewant Group is one of the indigenous leaders in Nigeria's Oil and Gas sector having invested heavily in Local Content Development in the sector with the establishment of a world class industrial complex that provides critical infrastructure in our energy sector.

In this interview with the Engr. Felicia Agubata PhD, FNSE and Engr. Udosen Idonrayin, MNSE, the GMD talked extensively on the role of Engineering in delivery of Gas value chain. Below are the excerpts.

Sir, given Solewant Group's commitment to local manufacturing, how has engineering played a role in enhancing local capacity in Nigeria's gas value chain?

I want to first and foremost thank the Nigerian Society of Engineers for the remarkable work they are doing in advancing engineering excellence in Nigeria. I also appreciate this opportunity to engage in this important conversation on *"The role of Engineering in Delivery of Gas Value"* across Nigeria's gas value chain. As an industrialist, I recognize that the gas industry is a key driver of Nigeria's economic future, and I am proud to say that Solewant Group is playing a vital role in ensuring that this

sector is strengthened through local manufacturing, engineering innovation, and capacity development. Let me speak briefly on Solewant Group's fast-growing industrial conglomerate with five subsidiaries, namely:

- **Solewant Nigeria Limited** – specializing in pipe coating, steel fabrication, and supply.
- **Field Joint Coating Limited** – focusing on advanced pipeline joint protection solutions.
- **Specialty Protective Coatings & Paints Limited** – producing world-class protective coatings and paints for industrial applications.
- **Pipes and Metals Industries Limited** – our state-of-the-art steel manufacturing and pipe-milling subsidiary.
- **Solewant Energy Training Institute (SETI)** – dedicated to training and upskilling Nigeria's energy workforce.

Now, with this background, I will then address Solewant Group's Commitment to Local Manufacturing. As a company that has invested heavily in local content development, Solewant Group has strategically positioned itself as a leader in Nigeria's oil and gas industry by establishing a world-class industrial complex that provides critical infrastructure for the energy sector. Our decision to invest heavily in local manufacturing stems from our belief that Nigeria has both the human and material resources to develop and sustain its own energy industry without over-reliance on imports. Through our Pipes and Metals Industries Limited, we manufacture high-quality steel pipes used for gas transmission, distribution, and infrastructure projects. Our Solewant Nigeria Limited subsidiary ensures that these pipelines are protected with cutting-edge coating solutions, preventing corrosion and enhancing durability. Instead of depending on foreign suppliers, oil and gas companies can now procure locally manufactured steel pipes and coated materials that meet international standards. This significantly reduces project costs, minimizes lead time, and boosts Nigeria's economy by retaining value within the country.

That takes me to the aspect of the question which speaks to how engineering enhances local capacity in Nigeria's Gas Value Chain. Engineering is at the core of everything we do at Solewant Group. From research and development to production and deployment, our engineering teams are constantly innovating to enhance local capacity in the gas value chain. We employ some of the most advanced technologies in automation, and latest technology driven manufacturing solutions to optimize production processes and ensure precision in our coating, milling, and fabrication operations. Additionally, we are not just creating infrastructure; we are building human capacity. Through Solewant Energy Training Institute (SETI), we are equipping Nigerian engineers, technicians, and industry professionals with the skills and expertise needed to support the country's gas industry. By providing specialized training in pipeline technology, coatings, and fabrication, as well as short specialized courses targeted at emerging oil and gas sector needs, we are developing a highly skilled workforce capable of driving Nigeria's gas value chain forward.

Furthermore, Solewant Group actively collaborates with the Nigerian Content Development and Monitoring Board (NCDMB) and other regulatory bodies to ensure that our manufacturing and engineering processes align with local content policies. This commitment has enabled us to secure partnerships with major industry players, including NNPC Limited, IOCs, NOCs, and EPC contractors, all of whom now see Solewant as a trusted provider of high-quality engineering solutions. As we look ahead, Solewant Group remains committed to deepening its impact across Nigeria's gas value chain. Our goal is not just to manufacture products but to engineer solutions, build capacity, and drive innovation that will shape the future of the energy industry.

What key engineering innovations or technological advancements do you believe are crucial for improving the efficiency of Nigeria's gas infrastructure?

I appreciate this question because engineering innovation is the backbone of any thriving energy sector. At Solewant Group, we understand that Nigeria's gas infrastructure must evolve to meet the demands of efficiency, sustainability, and reliability. If Nigeria is to fully harness its gas potential and transition into a global energy powerhouse, we must integrate cutting-edge engineering solutions across the entire gas value chain—from extraction to transportation, processing, and distribution. Now, let me address this question first starting with key engineering innovations for improving Nigeria's gas infrastructure.

- Advanced Pipeline Coating Technologies: One of the major challenges in Nigeria's gas sector is pipeline integrity. Corrosion and pipeline failures lead to gas losses, environmental hazards, and safety risks. Solewant Group has developed multi-layer pipeline coating solutions using Fusion Bonded Epoxy (FBE), Concrete Weight Coating (CWC), and Polypropylene Coating (PPC). These coatings extend the lifespan of gas pipelines, reduce maintenance costs, and enhance operational efficiency.
- Smart Pipeline Monitoring Systems: Traditional pipeline monitoring relies heavily on physical inspections, which can be inefficient and reactive. The future lies in Internet of

Things (IoT)-enabled Smart Pipeline Monitoring. By embedding sensors, drones, and AI-driven analytics, real-time data can be collected on pipeline integrity, pressure fluctuations, leak detection, and corrosion levels. These technologies allow for predictive maintenance, minimizing downtime and preventing catastrophic failures.

- Automation and Robotics in Gas Infrastructure Development: In the past, pipeline welding, coating, and inspections were manual processes, which increased the risk of human error. Today, robotic-assisted Automated Field Joint Coating (FJC) and Orbital Welding Technologies have revolutionized pipeline construction. Solewant Group is investing in advanced technological systems to enhance efficiency, precision, and safety in pipeline fabrication and coating applications.
- Gas Compression and Processing Innovations: Nigeria needs efficient Gas-to-Liquid (GTL) and Gas Compression Technologies to reduce flaring and optimize natural gas utilization. Micro-LNG (Liquefied Natural Gas) and Compressed Natural Gas (CNG) Technologies are game-changers in ensuring that Nigeria's gas resources are efficiently harnessed for power generation, industrial use, and transportation.
- Carbon Capture, Utilization, and Storage (CCUS): As the world transitions towards low-carbon energy solutions, gas-producing nations like Nigeria must adopt technologies that reduce greenhouse gas emissions. CCUS technology captures CO_2 from industrial processes and repurposes it for enhanced oil recovery (EOR) or long-term storage. This innovation ensures that gas production remains environmentally sustainable while aligning with global climate goals.
- Pipeline Fabrication with High-Strength Steel: Traditional pipeline materials are prone to wear and tear, leading to frequent replacements and disruptions. Our Pipes and Metals Industries Limited subsidiary is pioneering the manufacturing of high-strength, corrosion-resistant steel pipes that withstand extreme conditions, ensuring durability and efficiency in gas transportation.
- Digital Twin Technology for Gas Infrastructure: The concept of Digital Twins is transforming gas infrastructure management. This technology creates real-time virtual replicas of gas plants, pipelines, and facilities, enabling engineers to simulate operations, detect inefficiencies, and optimize system performance without disrupting actual operations. This technology needs to be explored to see how it will help improvements in the Nigerian gas sector operations.

Now, let me address the role of Solewant Group in driving some of these innovations. It is interesting to mention that, At Solewant Group, we are not just adopting these technologies—we are pioneering them in Nigeria's gas industry. Our planned R&D division, will be collaborating with universities to work on advanced manufacturing facilities, and partnerships with industry regulators to ensure that we provide cutting-edge solutions tailored to Nigeria's energy landscape in the near future. It is our belief that, by integrating these engineering innovations, we can make Nigeria's gas infrastructure more efficient, resilient, and sustainable. The future of energy in Nigeria depends on how well we leverage technology, enhance local manufacturing, and build an ecosystem that supports innovation and capacity development. Solewant Group is fully committed to being at the forefront of this transformation.

What are the major engineering challenges facing Nigeria's gas sector, particularly in pipeline manufacturing, transportation and processing?

I appreciate this question because addressing Nigeria's gas sector challenges is crucial for unlocking the full potential of our vast natural gas reserves. The gas industry is central to Nigeria's energy security and economic development, but significant engineering bottlenecks exist—particularly in pipeline

manufacturing, transportation, and processing. Having said that, let me say that at Solewant Group, we have firsthand experience dealing with these challenges and are actively pioneering solutions but before I come to that, let me focus first on the aspect of the question that deals with major engineering challenges in Nigeria's gas sector. I will take them one by one:

1. Pipeline Manufacturing Challenges: There is the issue of dependence on imported steel and other materials. Despite Nigeria's growing local content drive, a significant portion of pipeline materials—especially high-strength steel—are still imported. This increases production costs and leads to supply chain delays.

Next, there is the issue of limited local fabrication capacity. While Solewant Group's Pipes and Metals Industries Limited is addressing this gap by producing locally manufactured steel pipes, more heavy capital investment is needed to scale up fabrication to meet national demand.

Another challenge is that of corrosion and material degradation. Pipelines in Nigeria are exposed to harsh environmental conditions; this is leading to corrosion and reduced lifespan. Many operators still use suboptimal coatings, making pipelines vulnerable to leaks and structural failure. At Solewant Group, we deploy Fusion Bonded Epoxy (FBE) and Polyethylene Coatings to combat corrosion and extend pipeline durability and longevity.

2. Transportation Challenges: Let's look at the challenge of aging pipeline infrastructure and frequent failures. Many of Nigeria's pipelines were built decades ago and are now deteriorating. The lack of adequate regular maintenance and integrity testing has led to increased failures, leakages, and costly repairs.

Second to that, is the issue of pipeline vandalism and security risks. Gas pipeline vandalism remains a serious threat, disrupting supply and increasing operational costs. The industry needs advanced Pipeline Surveillance Systems, including drones, IoT-enabled sensors, and AI-powered monitoring infrastructure to detect and prevent breaches in real time.

More to this, is the challenge of limited gas pipeline network coverage. Nigeria lacks a robust pipeline infrastructure to effectively transport gas from production sites to demand centers. This results in excessive gas flaring and an overreliance on expensive trucking of CNG and LNG. Expanding the Ajaokuta-Kaduna-Kano (AKK) pipeline and other strategic gas corridors is critical for improving transportation efficiency.

3. Gas Processing Challenges: I will say, gas flaring due to insufficient processing facilities is another huge challenge. Nigeria still flares a significant portion of its associated gas due to inadequate processing capacity. The lack of sufficient gas gathering and processing plants makes it difficult to harness gas for power generation, industrial use, and export.

Let me say that, outdated and inefficient processing technologies is another challenge. Many existing gas processing plants use outdated technology, resulting in low processing efficiency and high operational costs. The industry needs to invest in multiple modular gas processing plants, advanced Liquefied Natural Gas (LNG) facilities, and Carbon Capture Utilization and Storage (CCUS) systems to enhance efficiency.

Solewant Group Industrial Park

Then again, there is the challenge of regulatory and policy inconsistencies. Inconsistent policies and delays in gas sector reforms create uncertainty for investors. Clear policies on gas pricing, fiscal incentives, and investment in processing infrastructure are needed to attract funding and drive growth in the sector.

At Solewant Group, our approach is targeted at solving these challenges in a little way. How do we do this, you may ask. At Solewant Group, we recognize that these challenges require engineering expertise, technological innovation, and

strong local capacity.

That's is why we are investing in: high-quality, locally manufactured pipeline solutions to reduce import dependency. Again, our advanced anti-corrosion coatings and field joint coating technologies for pipeline is designed for durability. More so, we plan to look into smart pipeline monitoring systems in a near future to assist clients in enhancing security and reduce leakages. We belief that, in addressing these key engineering challenges, Nigeria can unlock its full gas potential to drive industrial growth, and ensure a sustainable energy future.

With the global push for cleaner energy, how is Solewant Group integrating sustainable engineering practices into gas processing, transportation and infrastructure development?

Thank you for this very important question. The global energy landscape is undergoing a transformative shift, with sustainability and decarbonization now at the center of energy infrastructure development. At Solewant Group, we recognize that the future of Nigeria's gas sector depends on integrating sustainable engineering practices to reduce emissions, enhance efficiency, and build long-term resilience in gas processing, transportation, and infrastructure development.

Now, let me address the aspect of the question on sustainable gas processing practices. Before addressing sustainable gas processing, I must emphasize that Solewant Group is not directly involved in gas processing at the moment. Our current business scope primarily covers aspects of pipelines as a means of transportation, pipeline infrastructure development, steel fabrication, and protective coatings—all of which play a critical role in Nigeria's energy transition.

As a fully integrated local manufacturing and industrial solutions provider, Solewant Group operates in the following areas: Pipeline Manufacturing & Coating (Fusion Bonded Epoxy (FBE), Three-Layer to Five-Layer Polyethylene (3-5LPE), Internal Flow Coatings, etc.). Secondly, there's our Steel Fabrication & Industrial Components section which deals on pipe fittings, pressure vessels, structural steel, etc. Next is the anti-corrosion solutions (advanced protective coatings and pipeline rehabilitation solutions) and notably, we have technical & industry training section for professional development in coatings, welding, and pipeline technology through SETI—Solewant Energy Training Institute amongst others.

Having clarified that, we do not process gas, let me now come to our innovations in pipeline infrastructure, coatings, and logistics. No doubt, our services directly support Nigeria's gas transportation and sustainability efforts. Let me now highlight how we integrate sustainable engineering into our business operations.

1. Sustainable Pipeline and Infrastructure Development: Our advanced anti-corrosion and sustainable coatings solutions of one of Solewant Group's subsidiary, Specialty Protective Coatings & Paints Ltd, develops low-VOC (Volatile Organic Compounds) coatings solutions which helps ensure minimal environmental impact. Secondly, we deploy Fusion Bonded Epoxy (FBE) and Three-Five Layer Polyethylene (3LPE) coatings, which is reputed for extending pipeline lifespan with reduced maintenance needs. It also prevents leaks, thereby reducing environmental risks; again, there is the issue of smart pipelines and leak detection technology which is occupying our thinking at the moment.

We intend to partner with institutions to explore options leading to the integration of IoT-enabled sensors and AI-driven monitoring systems to detect pipeline leaks and methane emissions in real-time. Methane, as you know today is about 84 times more potent than CO_2. This is a major climate risk, and our leak detection systems which we envisage will help curb these emissions. At the heart of these technologies lies pipeline integrity management. This we belief will enhance operational

efficiency, reduce pipeline failures, and improve Nigeria's energy security on the long run.

2. Commitment to Sustainable Workforce and Capacity Development: The issue of green engineering and skills development at the forefront of our expansion drive. Through Solewant Energy Training Institute (SETI), we train engineers and technicians on: advanced coating technologies for corrosion protection, gas infrastructure lifecycle sustainability, carbon footprint reduction in energy projects thereby strengthening local content for sustainable development. By manufacturing pipeline materials and steel structures locally, we are helping in reducing carbon footprints from imports, we are also creating jobs, driving sustainable industrialization in Nigeria as well. Solewant Group is committed to a sustainable gas sector.

Our approach to sustainable engineering is not just about compliance—it is about leadership in Nigeria's energy transition. By deploying smart coatings, pipeline assets management and safety, we enhance gas transportation efficiency. Through advocacy for CNG adoption and logistics optimization, we enable cleaner mobility in the oil & gas industry. By investing in workforce training and local content, we strengthen Nigeria's industrial capacity. As Nigeria expands its gas infrastructure, Solewant Group is committed to providing innovative and sustainable solutions that ensure long-term industry growth and environmental responsibility.

Engineering plays a critical role in ensuring safety in gas handling and distribution. How does Solewant Group incorporate safety standards and risk mitigation strategies in its operations?

Thank you for raising this important question. Safety is a non-negotiable priority at Solewant Group, especially in aspects of our business that are linked to gas transportation, pipeline infrastructure management, and industrial coatings. As a company committed to engineering excellence, we integrate stringent safety standards, risk mitigation frameworks, and international best practices into every aspect of our operations.

As stated earlier that while Solewant Group is not directly involved in gas processing, our role in pipeline manufacturing, anti-corrosion coatings, and infrastructure development makes us a key enabler of safe gas handling and distribution. Let me break this down into three core areas:

1. Compliance with International Safety & Quality Standards: At Solewant Group, safety is engineered into every process. We maintain strict adherence to globally recognized standards, ensuring that all our pipeline and industrial coating solutions meet or exceed regulatory requirements. Take for instance, ISO Certifications. We operate under ISO 9001:2015 (Quality Management), ISO 14001:2015 (Environmental Management), and ISO 45001:2018 (Occupational Health & Safety). These certifications reinforce our commitment to workplace safety, product quality, and environmental sustainability.

Also, Solewant Group's membership in the Association for Materials Protection and Performance (AMPP) speaks to our alignment with international recognitions. As a member of AMPP (formerly NACE & SSPC), we align with global best practices in corrosion protection, pipeline integrity management, and material safety standards. This ensures that: our coatings prevent gas leaks caused by corrosion, our pipeline systems meet the highest safety benchmarks, and that we deploy advanced anti-corrosion solutions that extend pipeline lifespan and reduce maintenance risks.

Locally, our group is always compliant with industry specific regulatory bodies such as our compliance with NUPRC, NMDPRA, and NCDMB Safety Regulations. As we do business, we follow the Nigerian Upstream

Petroleum Regulatory Commission (NUPRC) and the Nigerian Midstream and Downstream Petroleum Regulatory Authority (NMDPRA) guidelines to ensure compliance in gas infrastructure development. Our work aligns with the Nigerian Content Development & Monitoring Board (NCDMB) regulations to promote local expertise and safe engineering practices.

2. Risk mitigation in pipeline and infrastructure development: Solewant Group integrates engineering-driven safety measures across our operations to prevent risks associated with gas handling and distribution by our clients. So, we take the issue of advanced pipeline integrity management seriously. We deploy Fusion Bonded Epoxy (FBE) and Three-Five Layer Polyethylene (3LPE) coatings, ensuring pipelines are highly resistant to corrosion, mechanical damage, and resistant to extreme weather conditions.

   Our coatings significantly reduce the risk of gas leaks and pipeline failures, enhancing the long-term safety of Nigeria's gas transportation network. Another point is that, our plants strictly adhere to fire safety protocols, including the use of flame-resistant coatings, automated fire suppression systems, and gas leak detectors. We conduct regular fire drills, emergency response training, and risk assessments to maintain a zero-incident workplace.

3. Workforce safety and capacity building: We ensure HSE (Health, Safety & Environment) Training for All Employees. We implement a mandatory safety induction program for all employees, contractors, and site visitors. Our workforce undergoes periodic HSE training on gas pipeline safety, hazard identification, and emergency response. That takes me to another important point which is that of the Solewant Energy Training Institute (SETI) – Safety Training Modules. Through SETI, we undertake training of industry professionals in areas of: pipeline integrity and corrosion protection, hazardous gas handling and safety protocols, emergency response and risk mitigation strategies amongst others.

We enforce the use of specialized PPE for all staff working in high-risk environments, including anti-static suits, fire-resistant gear, and gas detectors. A safety-first culture is embedded across all levels of our organization, ensuring that employees are proactive in hazard prevention. At Solewant Group, safety is not an afterthought—it is at the core of our engineering philosophy. By adhering to ISO certifications, AMPP standards, and Nigerian regulatory frameworks, we ensure world-class safety compliance. Through corrosion-resistant pipeline coatings, smart monitoring, and real-time leak detection, we reduce the risks associated with industrial operations. More so, by investing in safety training, HSE culture, and continuous innovation, we create an environment where operational excellence and safety go hand in hand. As Nigeria expands its gas infrastructure, Solewant Group remains committed to delivering safe, reliable, and sustainable engineering solutions that protect lives, assets, and the environment.

How can indigenous engineering companies collaborate more effectively to strengthen Nigeria's gas value chain and reduce dependence on imports?

At Solewant Group, we firmly believe that collaboration among indigenous engineering companies is the key to enhancing Nigeria's gas value chain, driving industrial growth, and reducing dependence on imports. Nigeria is endowed with vast natural gas reserves, yet we continue to rely heavily on imported infrastructure, technology, and expertise. To change this narrative, indigenous engineering firms must build strong partnerships and leverage collective strengths in key areas such as local manufacturing, research & development, capacity building, and policy advocacy.

Let me highlight five strategic areas where indigenous engineering companies can collaborate effectively:

1. Local Manufacturing and Supply Chain Integration: One of the biggest gaps in Nigeria's gas sector is over-reliance on imported pipes, coatings, and processing equipment. Many indigenous companies operate in silos, producing limited components while importing the rest. To break this cycle, we need Joint Manufacturing Ventures – Local engineering firms can co-invest in production facilities to manufacture pipes, pressure vessels, gas turbines, and processing units that meet global standards. Solewant Group, for instance, has a state-of-the-art steel manufacturing plant that can support indigenous collaboration in pipeline production.

   Shared Infrastructure and Resources – Engineering firms need to co-develop fabrication yards and testing facilities to ensure locally produced materials meet international quality benchmarks. More to this, is the case of Supply Chain Optimization – Indigenous manufacturers should build strong linkages with local suppliers of raw materials (e.g., steel, coatings, and polymers, etc.). This will reduce dependency on foreign suppliers and lower production costs.

2. Research and Development

(R&D) for Homegrown Gas Technologies: University-Industry Partnerships and Collaboration needs to work. Academic institutions can drive indigenous innovations in gas processing, storage, and transportation technologies. Solewant Group, through Solewant Energy Training Institute (SETI), is already working on R&D initiatives in pipeline integrity management, advanced coatings, and automation. Partnerships in these areas can lead to knowledge co-creation of home grown or indigenous technologies that will position the country in a dominant position. Now, that takes me to the next point which is on, Innovation Clusters and Technology Hubs – Indigenous engineering firms should pool resources to create technology hubs dedicated to the development of things such as smart gas monitoring systems, leak detection technology, and AI-powered pipeline diagnostics. These things are very important. Again, there is the issue of Standardization and Certification – To compete globally, Nigerian-made gas infrastructure components must meet AMPP, API, and ISO standards. Engineering firms should co-develop testing labs for quality assurance and certification to gain industry-wide acceptance. That takes me to the third point.

3. Workforce Development and Skills Exchange: A major challenge in Nigeria's gas sector is limited expertise in critical areas like pipeline fabrication, corrosion control, and automation. To address this: there has to be Industry-Led Training and Certification Programs – Companies should collaborate to train engineers, technicians, and welders in advanced pipeline engineering, coating technology, and gas infrastructure maintenance as well as all other critical aspects of gas value chain operations. SETI is already pioneering such industry-focused trainings. There is again, the issue of Skill Exchange and Secondment Programs – Indigenous companies should develop internship and secondment programs where employees gain hands-on experience across multiple firms to build a well-rounded engineering workforce. This compliments the next point I am going to make which is that of Local Content Expansion – With stronger indigenous expertise, companies can compete for more contracts under the Nigerian Content Development and Monitoring Board (NCDMB) framework; this of course will help in reducing the need for expatriate labor.

4. Engineering Collaborations for Large-Scale Projects: We all know that, the gas sector is capital-intensive, and most indigenous companies lack the financial muscle to execute large-scale projects alone. However, through strategic partnerships, local firms can jointly bid for contracts and execute them efficiently. So, there is need for Consortium Formation – Nigerian engineering firms should form consortia to design, construct, and maintain gas pipelines, LNG terminals, and CNG refueling stations. What about Project Co-Financing and Investment Synergy? – Engineering firms should pool financial resources and seek funding from local banks, development agencies, and public-private partnerships (PPPs) for major gas infrastructure projects. Now, to the last point which is…

5. Policy Advocacy and Government Engagement: Stronger Indigenous Lobby Groups – Engineering companies must collaborate more in terms of strategic engagement with policymakers and advocate for favorable policies that promote local manufacturing, tax incentives for indigenous firms, and reduced importation of gas equipment.

   More Incentives for Homegrown Innovations – The government needs to do a bit more in the area of providing grants, tax rebates, and low-interest loans to indigenous companies investing in gas infrastructure, research, and manufacturing. On the whole, at Solewant Group, we firmly believe that Nigeria's gas value chain can only thrive when indigenous engineering companies unite to drive innovation, manufacturing, and workforce development. This point is key to opening up the gas sector for both local and Foreign Direct Investment.

What policy changes do you think are necessary to enhance engineering contributions to the gas sector and to improve local capacity utilization?

We at Solewant Group belief that, to fully harness Nigeria's engineering expertise and maximize local capacity utilization in the oil and gas sector, three key policy adjustments are necessary:

1. Strengthening Local Content Enforcement: There is no gain saying the obvious that the Nigerian Content Development and Monitoring Board (NCDMB) has made significant progress in terms of strict enforcement of local content laws in the oil and gas industry. As Oliver Twist, we anticipate a situation where the executive and legislative arms of government will strengthen the body's sister agencies with policies and legislations that will effectively:

- Ensure indigenous companies get priority in contracts for gas infrastructure projects.
- Mandate higher local sourcing for pipes, coatings, and gas processing components.
- Implement penalties for unnecessary importation of engineering solutions already available locally.

2. Incentives for Indigenous Manufacturing & R&D: The issue of tax breaks and funding access should be prioritized for local engineering firms investing in gas pipeline fabrication, processing infrastructure, and technological R&D. Government should subsidize critical raw materials needed for pipeline coatings, steel production, and gas equipment manufacturing.
3. Infrastructure & Skills Development Policies: Investment in engineering skill development programs to train more engineers, welders, and automation specialists has become inevitable. With the trend in international labor migration increasing, local content development remains germane in this area. Government should create laws that support technology hubs and engineering innovation centers to fast-track homegrown solutions for gas infrastructure. Such laws and policies should create financial structures with low interest rates for startup companies. This will help young investors coming into the sector to find footing. With these policy reforms, Nigeria can reduce import dependency, empower local engineers, and establish itself as a global leader in gas technology.

What steps is Solewant Group taking to develop engineering talents in Nigeria, ensuring skilled workforce for the future of the gas industry?

At Solewant Group, we recognize that engineering talent is the backbone of the oil and gas industry. Without a highly skilled workforce, the industry cannot meet the evolving demands of our work on pipeline infrastructure, gas transportation, and asset integrity management and more. So, what are we doing in this regard? We have come up with the establishment of the Solewant Energy Training Institute (SETI) since 2022 as a strategic investment in building Nigeria's next generation of engineers, technicians, and industry leaders.

Our training programs are specifically designed to bridge skill gaps, enhance technical expertise, and align with global industry standards: Just to give you a glance of our array of courses. We structure the institute to operate a hybrid learning infrastructure with physical learning and also leveraging digital learning tools to transfer different levels of industry relevant skills to our trainees. Our target is the global audience, so, our courses fit into the following programs:

Short Courses for Entry & Mid-Level Professionals: we provide intensive training in pipeline technologies, coatings, corrosion control, oil and gas asset management to equip young and mid-career level engineers and technicians with the practical knowledge needed to succeed in the field.

Energy Sector-Specific Courses: With the global transition to cleaner energy, we are expanding our curriculum to cover emerging trends in energy sector processing, renewable energy integration, and sustainable energy infrastructure. Gas as you know is a transition fuel, so our curriculum in part covers that as well.

Pipeline Technical Certifications & Asset Integrity Management program: The safety and longevity of oil and gas pipelines require skilled integrity management specialists. SETI offers specialized training in pipeline integrity assessment, risk-based inspections, and advanced protective coatings—critical areas for Nigeria's gas infrastructure as well.

Management & Professional Development Program: Beyond technical skills, we train industry executives, project managers, and decision-makers through our Top Executive Management Program, ensuring that the global oil and gas sector is led by strategic, forward-thinking professionals.

Digital Skills for the Energy Industry: We are integrating emerging technologies such as AI, IoT, Digital Twins and automation into our curriculum. Our engineering training focuses on equipping professionals with future-ready skills for a technology-driven energy landscape.

At Solewant Group, we are not just running a business—we are building institutions with a legacy of technical excellence and industry leadership. Through SETI, we are ensuring that Nigeria's oil and gas sector remains competitive, with a highly skilled workforce capable of driving innovation and sustaining long-term industry growth.

Looking ahead, how do you see the role of engineering evolving in Nigeria's gas value chain, and what should industry stakeholders focus on to achieve long-term growth?

First, I want to sincerely appreciate the Nigerian Society of Engineers for this opportunity to discuss Solewant Group's role and the broader impact of engineering in shaping Nigeria's gas sector. Looking ahead, engineering will be the defining force in ensuring Nigeria's gas value chain remains competitive, sustainable, and innovative. The industry is evolving rapidly, and we must prioritize the following areas for long-term growth:

1. Advancement in Engineering and Local Manufacturing: Nigeria must reduce

dependence on imports and scale up indigenous manufacturing. With Solewant Group's investments in pipeline coatings, steel fabrication, and advanced materials, we are already proving that local expertise can deliver world-class solutions.

2. Technology-Driven Engineering Solutions: The future of gas infrastructure as with the entire energy sector will be shaped by automation, AI-driven pipeline monitoring, and smart coatings. Industry stakeholders must embrace digital transformation to enhance efficiency, minimize losses, and drive sustainability.
3. Sustainable Energy Infrastructure: As the world shifts toward cleaner energy, Nigeria must integrate sustainability into gas processing, transportation, and infrastructure development. Green engineering practices, such as CCUS, smart pipeline technology, and renewable energy integration, will define the future.
4. Stronger Industry Collaboration & Policy Support: To fully harness the potential of Nigeria's gas industry, there must be stronger collaboration between government, private sector players, and academic institutions. Favorable policies, local content enablement, and structured capacity-building programs will ensure sustainable growth.
5. Engineering Talent Development for the Future: At Solewant Energy Training Institute (SETI), we are equipping Nigerian engineers with industry-relevant skills. Our goal is to create a pipeline of talent that will not only sustain the gas sector but also position Nigeria as a leader in energy innovation across Africa.

Nigeria is at a pivotal moment in its energy transition journey. The role of engineering in the gas sector is no longer just about infrastructure—it's about sustainability, innovation, and global competitiveness. As an industry leader, Solewant Group is fully committed to driving this transformation through local content, cutting-edge technology, and workforce development. To all stakeholders in Nigeria's gas sector, the time to act is NOW. Engineering excellence, strategic investments, and collaborative efforts will determine the future of our energy industry- and our promise is that- Solewant Group will remain at the forefront of this journey.

Prof. Olugbenga Falode, Dr. Felicia Agubata, HE, Ambassador Wendell De Landro, Senator Bari Mpigi, Mr. Solomon Ewanehi, Senator Osita Ogwu, Engr. Wole Ogunsanya, Prof. Seth Accra Jaja, Prof. Remi-Uche, Dr. Olufemi Ajide. …. At the Solewant Group 8th Energy Summit held on November 26th and 27th, 2024.

Navigating the Hurdles: In-Line Inspection Challenges for Gas Pipeline Integrity in Nigeria's Gas Value Chain Delivery

Engr. Dr. Izionworu, Vincent Onuegbu, FNSE

Nigeria's extensive gas pipeline network plays a vital role in powering the nation's economy, and so maintaining the integrity of over 3,200 kilometers of pipeline network nationwide, (0.3 % of the 1,046,146 Global Pipeline infrastructure, Table 1), is crucial to ensure safe and reliable energy delivery. In-Line Inspection (ILI) has emerged as a key technology for assessing pipeline conditions, detecting defects, and mitigating potential failures. However, the implementation of ILI in Nigeria faces a unique set of challenges that must be addressed to maximize the effectiveness of these integrity programs. This article examines typical obstacles encountered during ILI campaigns in Nigeria, offering insights into potential mitigation strategies.

Pipeline integrity management in Nigeria has been guided by standards such as Petroleum Pipeline Regulations, Under Sections 136 and 191, Guidelines for Design Development Operations-of-Oil-Gas-Production-Facilities, and the Petroleum Industry Act (2021). Also Applicable to Nigerian gas pipeline integrity management is the American Society of Mechanical Engineers (ASME) B31.8S which provides a foundational standard for integrity management programs, while the American Petroleum Institute (API) 1163 focuses on ILI system qualification. Years ago Tiratsoo and Tiratsoo discussed pigging techniques for pre-pigging and pre-ILI cleaning, and Khan et al, highlights risk-based integrity management strategies, essential for prioritization in data-scarce environments. Dou and others reviewed the risks and management of pyrophoric scales as reported in several reports on pyrophoric dust. All of these are directly relevant to a major safety challenge in Nigeria and underscores the Importance of ILI in Nigeria's Gas Pipeline Infrastructure and the role of Engineering in the delivery of the gas value chain in Nigeria.

Gas pipelines in Nigeria face inherent risks due to factors such as corrosion, third-party damage, and aging infrastructure (The Nigerian Engineer Magazine, Q3, 2024). ILI provides a non-destructive method to assess the internal and external condition of pipelines, identifying anomalies such as metal loss, cracks, and dents without disrupting operations. By accurately characterizing these defects, Engineers working with operators can prioritize repairs, plan preventative maintenance, and ultimately reduce the risk of pipeline failures and ensure

delivery of gas value in Nigeria to the sectors in the value chain.

Typical Challenges Encountered During ILI: While ILI offers significant benefits, its application in Nigeria by Nigerian Engineers is often complicated by a range of challenges:

Pyrophoric Dust Hazards: The presence of pyrophoric dust within gas pipelines poses a serious safety threat. While there is a spontaneous combustion of PIS dust formed from iron sulfide - pyrophoric iron sulphides (PISs), this is not due to the combustion of PISs, rather it is the heat of the reaction of PISs upon exposure to air that spontaneously ignites the surroundings with a low ignition point leading to explosions or fires (Dou et al., 2023). Engineers and engineering Technologists engaged in ILI campaigns must incorporate rigorous pre-cleaning procedures and safety protocols to minimize the risk of ignition.

Limited Baseline Data: Many of Nigeria›s older gas pipelines lack comprehensive historical inspection data. This absence of baseline information makes it difficult to assess the rate of degradation and predict future performance. In the absence of previous ILI surveys, it is challenging for Engineers to establish and identify accurate corrosion growth rates and effectively prioritize maintenance activities.

Logistical Complexities: Nigeria›s infrastructure challenges, including poor road conditions and heavy traffic congestion, significantly impact the logistics of ILI operations. The transport of specialized equipment, movement of personnel, and access to remote pipeline locations can be severely hampered, resulting in delays and increased costs.

Scope and Responsibility Definition: Lack of clarity on the roles and responsibilities of each party can be a major challenge. Ambiguity in defining the scope of work for certain project elements, such as dewatering, drying, and effluent management for environmental pollution control, can result to delays and cost overruns if not adequately addressed through clearly defined contracts and communication channels. This cannot be treated in isolation without reference to inflation factors that might induce cutting of corners

Nature of Pipeline: The need to measure long distances pipelines at high speed also exists. Related to this challenge is to negotiate tight or very tight bends that induce significant forces, and cause obstructions in the form of weld protrusion in the pipe, and some reduced-port valves. debris that prevents efficient tool sensors from capturing the true internal condition of the pipe and other inspection dilemmas (Nestleroth, ECNDT 2006 - Mo.2.5.1).

Mitigation Strategies: Overcoming these challenges requires a multi-faceted approach by Engineers:

Enhanced Pre-Cleaning Procedures: Implement robust pre-cleaning protocols to remove pyrophoric dust safely and effectively. This may involve using specialized cleaning pigs, chemical solvents, and nitrogen purging techniques in line with API 1163.

Risk-Based Inspection (RBI): Apply RBI methodologies to prioritize inspection efforts on pipelines with the highest risk profiles. This involves assessing the probability of failure and the consequence of failure to determine inspection intervals and techniques.

Advanced ILI Technologies: Utilizing advanced ILI tools capable of detecting a wide range of anomalies with high accuracy and resolution is essential. This may include magnetic flux leakage (MFL) tools, ultrasonic testing (UT) tools, electromagnetic acoustic transducer (EMAT) tools, and Combo tools like BG Technical magnetic flux leakage (MFL) with LINALOG HR deformation tool that was deployed to inspect SNG Western AGOT Gas Transmission and Distribution Pipelines.

Improved Logistics Planning: Develop detailed logistical plans that account for Nigeria›s infrastructure limitations. This may involve using specialized transportation equipment, securing necessary permits in advance, and establishing contingency plans to address unexpected delays.

Effective Stakeholder

Collaboration: Collaboration with local communities and government agencies is crucial for obtaining access to pipeline locations and ensuring the safety of ILI operations. Open communication and engagement with stakeholders can help address concerns and resolve potential conflicts.

Clear Contracts and Scope Definition: Clearly defined scope of work and responsibilities of all parties involved to minimize disputes and delays.

Conclusion

In-line Inspection is a valuable tool for ensuring the integrity of gas pipeline networks in Nigeria. By proactively addressing the unique challenges associated with ILI implementation, Engineers can improve pipeline safety, reduce operational risks, and enhance the reliability of energy delivery. Investment in advanced inspection technologies, robust pre-cleaning procedures, and effective logistical planning is essential for maximizing the benefits of ILI and safeguarding Nigeria's critical gas pipeline infrastructure for smooth energy delivery.

Table 1: Global gas pipeline km by region and status (Global Energy Monitor December 2024)

Region	Subregion	Proposed	Construction	Proposed+ Construction	Shelved	Cancelled	Operating	Idle	Mothballed	Retired
Africa	Northern Africa	6,140	1,122	7,261	412	275	42,476		1,333	
	Sub-Saharan Africa	19,388	1,582	20,970	1,275	177	7,142			
Americas	Latin America and the Caribbean	15,555	2,885	18,440	4,734	3,562	62,036	331	224	
	Northern America	7,980	3,224	11,205	3,818	20,655	400,990	111		
Asia	Central Asia	4,555	814	5,368	966	1,991	32,488		534	
	Eastern Asia	42,161	27,973	70,134	7,285	4,424	144,943		128	155
	South-eastern Asia	8,849	666	9,515	2,562	1,479	17,603			
	Southern Asia	10,652	23,338	33,990	2,199	12,203	40,327			35
	Western Asia	4,484	9,773	14,256	2,761	9,004	37,445		842	39
Europe	Eastern Europe	22,157	5,053	27,210	2,451	9,888	145,167	1,652	3,010	2,881
	Northern Europe	972	1	974	1,000	1,004	25,672		1,822	564
	Southern Europe	6,766	986	7,752	834	4,436	28,487		17	
	Western Europe	906	98	1,004		2,138	28,616	8	148	
Oceania	Australia and New Zealand	9,857	4	9,861	3,726	7,215	32,038			
	Melanesia	320		320	400	301	716			
	Micronesia									
	Polynesia									
Total		160,741	77,519	238,260	34,424	78,751	1,046,146	2,102	8,058	3,675

For further reading: (1) Engineering Professional Ethics in Pipeline Integrity Management and the Associated Ethical Issues. The Nigerian Engineer Magazine, Q3, 2024; (2) American Society of Mechanical Engineers (ASME). (2022). *ASME B31.8S, Managing System Integrity of Gas Pipelines*. New York, NY: ASME; (3) American Petroleum Institute (API). (2021). *API 1163, In-Line Inspection Systems Qualification*. Washington, D.C.: API.; (4) Tiratsoo, J. N., & Tiratsoo, J. (Eds.). (1992). Pipeline pigging technology. Gulf Professional Publishing.; (5) Khan, F., Yarveisy, R., & Abbassi, R. (2021). Risk-based pipeline integrity management: A road map for the resilient pipelines. Journal of Pipeline Science and Engineering, 1(1), 74-87.; (6) Dou, Z., Li, L. L., Liu, Z., Min, Y. M., Guo, S. J., Chen, L. C., ... & Shu, C. M. (2023). Oxidation to spontaneous combustion of pyrophoric iron sulphides in the process industries: A review. Journal of Loss Prevention in the Process Industries, 105171.; (7) J. Bruce Nestleroth. Pipeline In-line Inspection – Challenges to NDT. ECNDT 2006 - Mo.2.5.1; and (8) Guidelines for Design Development Operations of Oil Gas Production Facilities Ver-5 November, 2023.

Global Perspective on the Role of Engineering in the Delivery of the Gas Value Chain

Engr Dr. Abdullahi A Mas'ud, MNSE

1. Introduction

The gas value chain consists of multiple essential steps, including exploration, production, processing, transportation, distribution, and usage. Engineering disciplines are essential for optimizing each process while assuring efficiency, safety, and sustainability. During the exploration and production phases, engineers use innovative technology to find and extract natural gas sources. Techniques such as seismic imaging and horizontal drilling have improved access to complicated reservoirs, resulting in higher recovery rates. Once recovered, raw natural gas is processed to eliminate contaminants and isolate valuable hydrocarbons. Acid gas re moval, dehydration, and fractionation are used to fulfill market criteria while recovering byproducts including ethane, propane, and butane. Large pipeline networks and liquefied natural gas (LNG) systems make it easier to transport processed gas. Engineers create these infrastructures to ensure structural integrity, monitor flow rates, and apply safety standards to avoid leaks and ruptures.

Engineers supervise the design of distribution networks, metering systems, and combustion equipment throughout the distribution and usage phases to guarantee that residential, commercial, and industrial users get safe and efficient service. Throughout the gas value chain, engineering disciplines such as petroleum, chemical, mechanical, and civil engineering work together to improve operations, increase safety, and reduce environmental impact. Continuous technological and technical improvements are required to fulfill the world's expanding energy demand on a sustainable basis.

2. The Influence of Engineering on the Gas Value Chain of Different countries

The United States of America

The Marcellus Shale formation in the United States is one of the country's major natural gas reservoirs, with its primary location in Pennsylvania and West Virginia. Engineers employed modern horizontal drilling and hydraulic fracturing methods to extract this resource. For example, a single horizontal well in the Marcellus Shale may be more than 10,000 feet long and generate more than 10 million cubic feet of natural gas per day. This is a huge boost over standard vertical wells, which may yield just a tenth of the quantity. Hydraulic fracturing has helped improve US natural gas output, which is expected to hit a record high of more than 35 trillion cubic feet in 2022, according to the US Energy

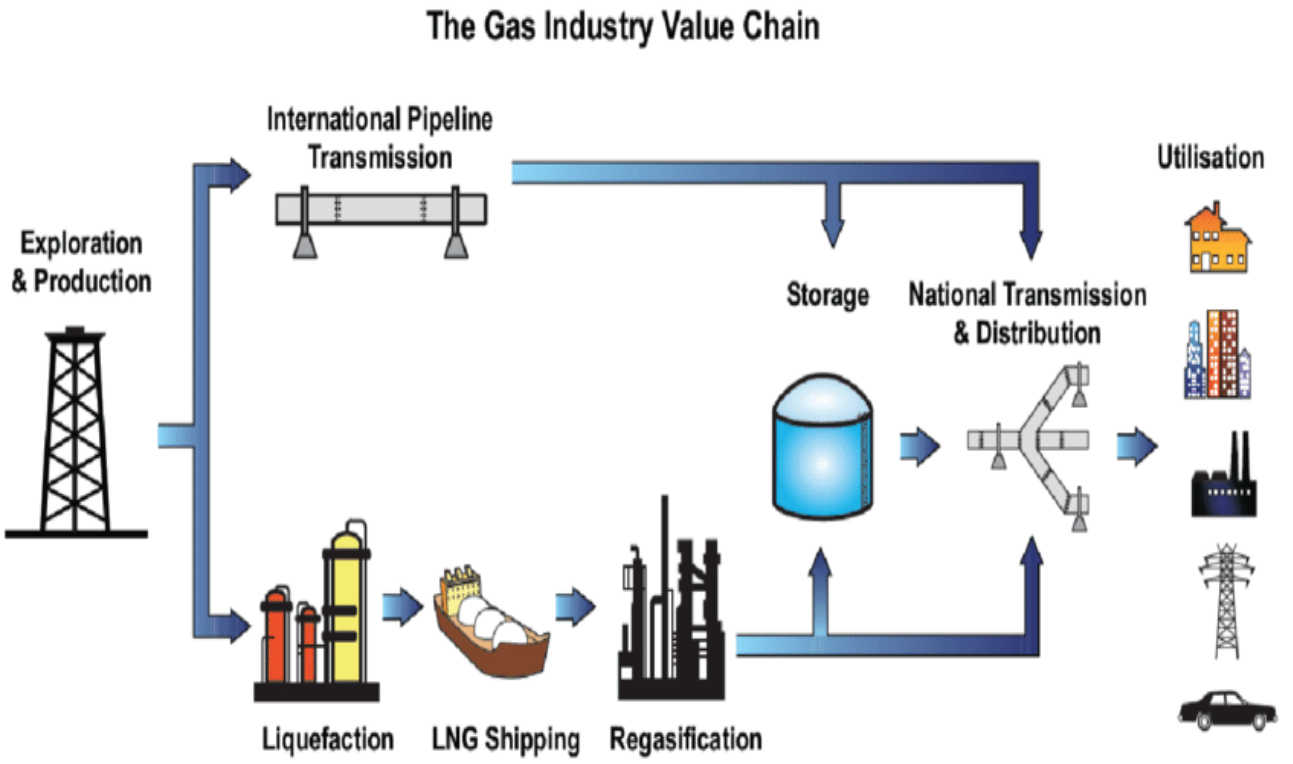

Figure 1: Gas Industry value chain

Information Administration.

Another example is the Permian Basin of Texas and New Mexico, which is one of the world's most productive oil and gas areas. Engineers used modern seismic imaging tools to survey the subsurface and find the best drilling sites. In certain circumstances, 3D seismic surveys increased drilling success rates by up to 50%, lowering the likelihood of dry wells. The Permian Basin alone accounts for approximately 40% of US crude oil production and a significant share of natural gas production, with output reaching 15 billion cubic feet per day.

In terms of offshore exploration, the Gulf of Mexico is an important location for natural gas production. Engineers have created deepwater drilling technology to tap reserves thousands of feet under the ocean's surface. For example, Shell's Appomattox deepwater platform may produce up to 175,000 barrels of oil equivalent per day, with natural gas accounting for a large fraction of that total. This platform manages production in tough deepwater settings by using modern subsea technology and remotely driven vehicles.

In the United States, technical advancements continue to propel development in the exploration and production stages. For example, digitization has allowed the use of real-time data analytics to improve drilling and production. Companies like as Chevron have deployed complex data systems that integrate data from hundreds of sensors throughout their operations, resulting in better decision-making and reduced downtime. Similarly, automation has resulted in the creation of robotic drilling devices that work more precisely and efficiently. These technologies have cut drilling times by up to 30% in certain circumstances, decreasing expenses while increasing production.

Despite these advances, challenges still exist. For example, accessing unconventional deposits such as shale gas often requires large water resources. A single hydraulic fracturing procedure may use 1.5 million to 16 million gallons of water, depending on the well's characteristics. Engineers are addressing this problem by creating waterless fracking devices that use carbon dioxide or nitrogen instead of water. Market changes may also have an impact on the economic feasibility of natural gas production. In 2020, the COVID-19 pandemic prompted natural gas prices to plummet to record lows, with Henry Hub spot prices plunging below $2 per million British thermal units, leading operators to reduce output.

United Kingdom

The North Sea is the largest natural gas producing area in the United Kingdom. Over the last five decades, engineers have created cutting-edge technology to tap gas

deposits in this difficult offshore environment. For example, the Clair Ridge project, managed by British Petroleum and situated west of the Shetland Islands, is one of the UK's biggest offshore gas resources. The project employs modern drilling methods seismic imaging and horizontal drilling methods to create the field, which went into production in 2016. Cygnus now delivers around 6% of the UK's natural gas consumption, which is enough to heat more than 1.5 million homes yearly. The field also uses carbon security and reducing the need for additional offshore platforms.

In the UK, another area that engineering has made an impact is waste water management. In the North Sea, generated water from gas extraction is treated

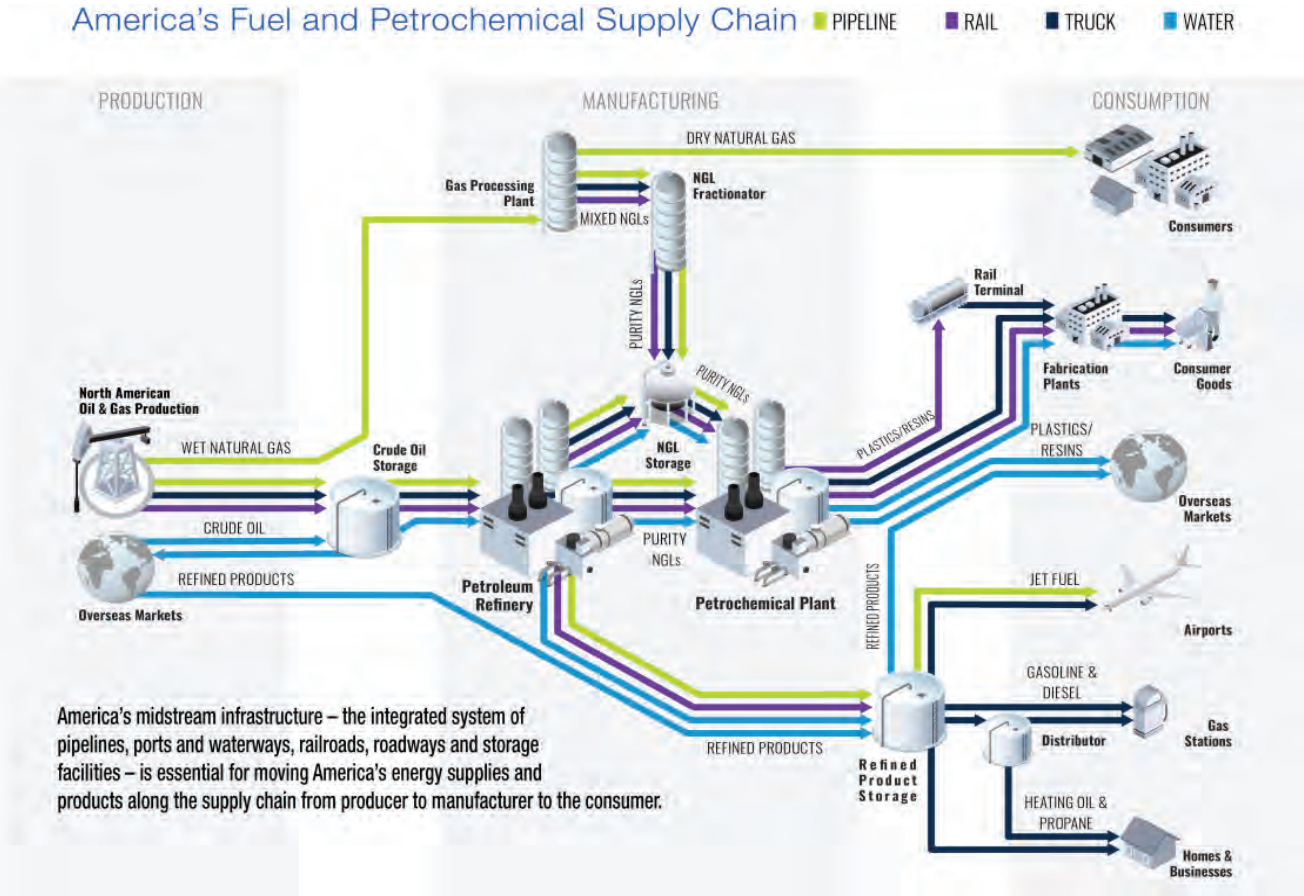

Figure 2: The united states Natural Gas Supply Chain

and subsea equipment to recover gas from reserves more than 4,000 meters under the seafloor. Clair Ridge is planned to generate up to 120,000 barrels of oil equivalent per day, with a large percentage coming from natural gas. The project also includes novel water injection techniques to improve gas recovery and prolong the field's life. Another famous example is the Cygnus gas field, managed by Neptune Energy in the southern North Sea. Cygnus is one of the greatest gas fields found in the United Kingdom in the last 25 years, with reserves estimated at 18 billion cm3. Engineers employed modern capture and storage technology to minimize emissions, in line with the UK's net-zero ambitions.

In recent years, the UK has increasingly concentrated on discovering and developing smaller, marginal gas reserves that were previously deemed uneconomic. For example, Shell's Penguin field connects smaller reservoirs to existing infrastructure using a subsea tieback system. This strategy lowers development costs and environmental effect. The Penguin field is projected to generate up to 45 million cubic feet of gas per day, adding to the UK's energy and reinjected into reservoirs to maintain pressure and improve recovery. In certain cases, up to 90% of the generated water is recycled, mitigating the environmental effect of gas production. Engineers have also created modern filtering systems to remove impurities from wastewater before it is dumped into the sea, assuring compliance with stringent environmental standards.

Technological advancements have played a key role in improving the efficiency of gas exploration and production in the UK. Digitalization, for example, has enabled real-time monitoring

and optimization of offshore operations. Companies like BP and Shell have implemented advanced data platforms that integrate information from thousands of sensors across their assets. These platforms use artificial intelligence to predict equipment failures and optimize production, reducing downtime and operational costs. Automation has also been widely adopted, with robotic systems performing tasks such as pipeline inspections and subsea maintenance. These technologies have improved safety by reducing the need for human intervention in hazardous environments.

Despite these developments, the UK encounters many hurdles in its gas exploration and production efforts. As the North Sea basin matures, many of the most accessible gas sources have already been exploited. Engineers are increasingly focused on extracting gas from smaller, more complicated reserves, which need better technology and more expenditure. Furthermore, the UK's shift to a low-carbon economy has heightened scrutiny of the oil and gas industry. Engineers are striving to connect gas production with the country's climate objectives by constructing carbon capture projects and investigating the possibility of producing hydrogen from natural gas.

Finally, the exploration and production phase of the gas value chain in the UK is a complex and dynamic process that relies heavily on engineering expertise. Examples like the Clair Ridge, Cygnus, and Penguin fields demonstrate the scale and innovation involved in extracting natural gas from the North Sea. Engineers are addressing environmental and safety challenges through technologies such as methane detection, zero-flaring, and wastewater recycling. At the same time, they are driving progress through digitalization, automation, and the development of CCS projects. These efforts ensure that the UK can meet its energy needs while advancing toward its net-zero emissions targets.

CANADA

The Western Canadian Sedimentary Basin, which includes Alberta, British Columbia, and sections of Saskatchewan, is the hub of Canada's natural gas industry. Engineers have developed cutting-edge drilling and completion procedures to extract gas deposits in this area. For example, the Montney Formation, one of North America's greatest natural gas deposits, is expected to contain more than 449 trillion cubic feet of recoverable gas. Engineers employ horizontal drilling and multi-stage hydraulic fracturing to recover gas from this low-permeability reservoir. The Montney is one of Canada's most prolific gas fields, with a single horizontal well producing up to 10 million cubic feet of gas per day. The Montney Formation alone provides for approximately 30% of Canada's natural gas production, producing more than 6 billion cubic feet per day.

Another well-known location is the Horn River Basin in northern British Columbia, which is recognized for its shale gas deposits. Engineers used modern seismic imaging and reservoir modelling methods to optimize well location and maximize recovery. The Horn River Basin is expected to hold more than 78 trillion cubic feet of recoverable gas. Companies like Encana (now Ovintiv) have pioneered the use of pad drilling in this area, which involves drilling many wells from a single position to minimize surface disturbance and environmental effect. This method has increased operating efficiency and lowered expenses, making it economically feasible to exploit these resources.

Offshore gas production is a significant portion of Canada's natural gas sector, especially in the Atlantic area. The Sable Offshore Energy Project, situated off the coast of Nova Scotia, was among Canada's earliest offshore gas ventures. Engineers constructed and implemented subsea infrastructure, such as pipes and production platforms, to harvest gas from depths of more than 100 meters. At its height, the Sable project produced more over 500 million cubic feet of gas per day, meeting local and export demands. Although the Sable project halted production in 2018, it cleared the way for further offshore initiatives, such as the Deep Panuke project, which extracted gas from even deeper depths.

New developments in engineering have also had a significant impact on water management. A lot of water is needed for hydraulic fracturing in places like the Montney Formation. To lessen the strain on freshwater supplies and other natural resources, engineers have devised water treatment and recycling technologies that enable operators to reuse as much as 90% of the water that is generated. Fracturing operations may sometimes make use of non-potable water sources, including salty groundwater, in an effort to further decrease the need for freshwater.

The effectiveness and longevity of Canada's gas exploration and production have been greatly enhanced by technological developments. For instance, drilling and production processes may now be optimized and monitored in real-time thanks to digitization. Canadian Natural Resources Limited and Cenovus are among the companies that have deployed cutting-edge data platforms to aggregate data collected from thousands of sensors located across their various holdings. By optimizing production and using AI and ML to forecast when equipment may break, these systems can cut

down on downtime and operating expenses. The use of robotic devices for inspections of pipelines and well completions is only one example of the widespread use of automation. By lowering the threshold for human involvement in potentially dangerous settings, these technologies have enhanced safety.

Canada faces several challenges in its gas exploration and production activities. The remote location of many gas reserves, particularly in the Arctic and offshore regions, presents logistical and environmental challenges. Engineers are working to develop innovative solutions, such as modular drilling rigs and ice-resistant platforms, to access these resources. Additionally, the transition to a low-carbon economy has led to increased scrutiny of the oil and gas sector. Engineers are working to align gas production with Canada's climate goals by developing carbon capture projects and exploring the potential of hydrogen production from natural gas.

JAPAN

Japan's exploration and production phase of the gas value chain is distinct owing to the country's low local natural gas reserves and dependence on imports. However, Japan has been aggressively exploring and exploiting its indigenous gas resources, especially offshore, in order to improve energy security and minimize reliance on foreign imports. Engineers are important to tackling the problems provided by Japan's complicated geology, deep-water settings, and strict environmental rules. The following examples demonstrate the importance of engineering in Japan's gas exploration and production.

Japan's domestic natural gas production is relatively small compared to its consumption, with most of its gas coming from offshore fields. One of the most significant domestic gas fields is the Minami-Nagaoka Gas Field, located in the Niigata Basin on the western coast of Honshu. This field has been in production since the 1980s and is operated by INPEX Corporation. Engineers have used advanced drilling and completion techniques to extract gas from deep, complex reservoirs. The field produces approximately 200 million cubic feet of gas per day, contributing to Japan's domestic supply. Engineers have also implemented carbon capture and storage technology at the Minami-Nagaoka field to reduce CO2 emissions. Another example is the Mobara Gas Field in Chiba Prefecture, which has been producing natural gas since the 1930s. This field is notable for its use of innovative engineering solutions to extend its productive life. Engineers have employed enhanced recovery techniques, such as water and gas injection, to maintain reservoir pressure and improve gas recovery rates. The Mobara field produces around 50 million cubic feet of gas per day, supplying local industries and households.

Offshore exploration is a key focus for Japan, particularly in the Nankai Trough, a subduction zone off the Pacific coast that is believed to hold significant methane hydrate reserves. Methane hydrates are a potential future energy source, and Japan is a global leader in their exploration. In 2013, Japan successfully conducted the world's first offshore production test of methane hydrates in the Nankai Trough, extracting gas from deep-sea deposits located 1,000 meters below the seabed. Engineers developed specialized drilling and production technologies to handle the high pressures and low temperatures associated with methane hydrate extraction. While commercial production is not yet viable, this achievement represents a significant step forward in unlocking a potentially vast energy resource.

The effectiveness of Japan's gas exploration and production has been greatly enhanced by technological developments. For instance, drilling and production processes may now be optimized and monitored in real-time thanks to digitization. Modern data platforms have allowed companies like INPEX and JAPEX to combine asset-wide data collected by thousands of sensors. By optimizing production and using Artificial intelligence to forecast when equipment may break, these systems can cut down on downtime and operating expenses. Robotic systems are now routinely used for automation, with applications ranging from subsea maintenance to pipeline inspections. By lowering the threshold for human involvement in potentially dangerous settings, these technologies have enhanced safety.

However, Japan faces several challenges in its gas exploration and production activities. The country's limited domestic reserves and complex geology make it difficult to achieve large-scale production. Engineers are working to develop innovative solutions, such as modular drilling rigs and advanced seismic imaging technologies, to access hard-to-reach reserves. Furthermore, Japan's transition to a low-carbon economy has led to increased scrutiny of the oil and gas sector.

AUSTRALIA

Australia's exploration and production phase in the gas value chain is critical to its energy industry, since the nation is one of the world's top exporters of liquefied natural gas (LNG). Australia's natural gas deposits are principally found in the offshore of Carnarvon, Browse, and Bonaparte Basins off the northwest coast, as well as onshore in the Cooper Basins of South Australia and

Queensland. Engineers play a critical role in extracting these resources in an efficient, safe, and ecologically friendly manner. The following examples demonstrate the importance of engineering in Australia's gas exploration and production.

The Gorgon Project, situated on Barrow Island at the Western Australia's coast, is one of the country's most major gas project. Chevron operates Gorgon, which is one of the world's biggest natural gas ventures. Engineers used modern drilling and subsea technology to harvest gas from reserves buried more than 2,000 meters under the seafloor. The project comprises a 15.6 million-tonne-per-annum LNG plant and one of the world's biggest carbon capture facilities. The project is intended to decrease CO2 emissions by injecting up to 4 million tons per year into deep underground reservoirs. Gorgon generates more than 2 billion cubic feet of gas per day, serving both local and international markets.

INPEX operates another significant project in the Browse Basin, the Ichthys LNG Project. This project includes collecting gas from the Ichthys Field, which is situated roughly 220 kms offshore in depths up to 275m deep. Engineers have constructed and erected the Ichthys Explorer, one of the world's biggest semi-submersible platforms. An 890-km undersea pipeline transports the gas to the onshore LNG facility in Darwin, Northern Territory. The Ichthys project can produce 8.9 MTPA of LNG and 1.6 million tonnes of liquefied petroleum gas per year, making it a significant contribution to Australia's LNG exports.

The Cooper Basin, located onshore in South Australia and Queensland, is a significant natural gas production center. Engineers extracted gas from tight sandstone reserves using improved horizontal drilling and hydraulic fracturing methods. The Cooper Basin generates around 500 million cubic feet of gas per day, which feeds domestic markets and supports Australia's east coast gas network. Santos, one of the region's major operators, has adopted innovative water management systems that treat and recycle generated water, lowering freshwater consumption and environmental effect.

The effectiveness and longevity of gas exploration and production in Australia have been greatly enhanced by technological developments. For instance, drilling and production processes may now be optimized and monitored in real-time thanks to digitization. Advanced data platforms have been deployed by companies such as Santos and Woodside Energy to combine data from hundreds of sensors distributed throughout their properties. By optimizing production and using Artificial intelligence to forecast when equipment may break, these systems can cut down on downtime and operating expenses. Finally, the exploration and production phase of the gas value chain in Australia is a complex and dynamic process that relies heavily on engineering expertise. Examples like the Gorgon Project, Ichthys LNG Project, Cooper Basin, and Surat Basin demonstrate the scale and innovation involved in extracting natural gas from diverse environments. Engineers are addressing environmental and safety challenges through technologies such as methane detection, water recycling, and digitalization.

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Mr. George Olutope Onafowokan (FNSE)
Managing Director/ CEO Coleman Technical Industries

Mr. George Olutope Onafowokan is a distinguished professional and accomplished entrepreneur. He holds a combined bachelor's degree in accounting and finance from Manchester Metropolitan University, UK, and a Post Graduate Diploma in Management and Information Systems from the University of Salford, UK.

He is a member of Professional bodies such as Manufacturers Association of Nigeria (MAN) and The Lagos Chamber of Commerce & Industry (LCCI). He was recently conferred honorary fellow of the Nigerian

Society of Engineers (FNSE), for his outstanding contributions to the Engineering Society at large.

A distinguished professional and accomplished entrepreneur, Mr. George Onafowokan currently serves as the Managing Director/CEO of Coleman Technical Industries Limited, a renowned manufacturer of Coleman Wires & Cables. He also holds the esteemed position of Chairman at the Manufacturers Association of Nigeria (MAN), Ogun State Chapter.

Mr. George Onafowokan has made transformative contributions to the cable manufacturing industry and

Energy sector. His research and innovative designs have significantly enhanced the development of high performance cable technologies, with a particular focus on fire-resistant cables. Coleman's cables offer superior conductivity, durability, and fire safety through advanced materials and insulation techniques.

Mr. George Onafowokan optimized manufacturing processes, implementing automation and quality control, seting industry standards and positioning Coleman as a market leader in innovation and quality.

Under his leadership, Coleman has achieved significant milestones, including:

- Commissioned the first voltage XLPE cable plant in West Africa; Commenced a 25,000-ton factory to manufacture 36KV low-high voltage Marine, Transmission, ACCC, GAP and power cables.
- Commissioned the first FIBRE OPTIC cable plant in West Africa; Pioneering products like Coaxial TV/Video cables and Cat 5/Cat 6 cables, seting new standards in Nigeria and West Africa.
- Commissioned the largest cable manufacturing factory in West Africa at Arepo, Ogun State with installed capacity to process 8,000 metric tons of copper and 4,000 metric tons of aluminum per annum.

In summary, Mr. George Onafowokan's remarkable journey from his academic pursuits in the UK to his transformative leadership at Coleman Technical Industries Limited underscores his unwavering dedication to excellence, innovation, and the economic development of Nigeria.

Rt. Hon. Ekperikpe Ekpo

Honourable Minister of State, Petroleum Resources (Gas).

Rt. Hon. (Obongemem) Ekperikpe Ekpo hails from Ikot Udom village in Ika Local Government Area of Akwa Ibom State.

Ekperikpe Ekpo holds a Bachelor of Science, (B.Sc) in Biology (Ecology), Masters degree in Environmental Pollution and Toxicology, and a Doctor of Philosophy (Ph.D.) in Environmental Pollution and Toxicology, all from the University of Calabar (UNICAL), Cross Rivers State.

Ekpo's career spans over three decades, with a strong foundation in education. He taught at Queen of Apostles Seminary, Abak, for over a decade, rising to the position of Head of Department (HOD) Science and Dean of Studies.

His transition into public service began in 2002 and is marked by several notable positions, including:

- Care-taker Chairman of Ika Local Government Council (2003)
- Head of Council, Ika Local Government Area (2004)
- Member of the House of Representatives (2007-2011), representing Abak/Etim Ekpo/Ika Federal Constituency
- Deputy Chairman, House Committee on Industry and member of various committees, including Customs Service, National Security and Intelligence, Power, and Niger Delta Affairs
- Minister of State for Petroleum Resources (Gas) (2023), appointed by President Bola Ahmed Tinubu to unlock Nigeria's gas deposits for national growth and development.

Throughout his career, Ekpo has demonstrated exceptional leadership, commitment to public service, and a passion for community development. His dedication to Nigeria's growth and prosperity has earned him recognition and respect from his peers and constituents.

TOP ENGINEERING PROFESSIONALS: WHO IS WHERE!!

Major General Aniedi Effiong Edet, FNSE

Director General Defence Industries Corporation of Nigeria (DICON).

Aniedi Effiong Edet is a Major General and currently the Director General Defence Industries Corporation of Nigeria. He holds a Bachelor of Engineering degree in Electrical/ Electronics Engineering from the Nigerian Defence Academy, Kaduna; Master's in International Affairs and Diplomacy from Ahmadu Bello University, Zaria, Masters of Governance and Leadership from Ghana Institute for Management and Public Administration, Masters of Science in National Security Strategy from the US National Defence University, Washington DC. He has participated actively in many ECOWAS and United Nations missions. He joined the US National War College as International Fellow and graduated in June 2017, as Distinguished Graduate and winner of Best Individual Student Research Paper. His honours and awards include; Distinguished Service Star, Fellow of the Defence College (+), pass staff college (++), Field Training Assistant Medal (Ghana), Field Command Medal, Nigerian Army Innovation Medal and COAS Commendation Award. Major General Edet is a member of several professional bodies, including Nigerian Society of Engineers, Council for the Regulation of Engineering in Nigeria and Africa Centre for Strategic Studies, Washington DC. He has presented, and contributed many scholarly papers to journals and books.

Major General Babatunde Ibrahim Alaya, FNSE
Commander Command Engineering Depot

Babatunde Ibrahim Alaya is a Major General and currently the Commander Command Engineering Depot Rigachikun Kaduna. He graduated with honours in the top 10 per cent of his class with a Bachelor of Engineering degree in Mechanical Engineering from the United States Military Academy (West Point) New York; Master's in International Relations and Strategic Studies from Nigerian Defence Academy Post Graduate School and Master's in Mechanical Design and Production Engineering from Enugu State University of Science and Technology. He participated actively in several operations within and outside Nigeria including United Nations Missions in Liberia (UNMIL), Operation LAFIYA DOLE and all subsidiary operations and Operation HAKIN KAI and all subsidiary operations. He joined the Nasser Higher Military Academy High War College Egypt as International Fellow and graduated in July 2018, as the best International Fellow winning the Presidential Medal for best Graduating Fellow. His honours and awards include; Distinguished Service Star, Fellow of the Nasser Higher Military Academy High War College Egypt, pass staff college (+), pass land staff course (+) Canada, Field Command Medal, Nigerian Army Innovation Medal and COAS Commendation Award. Major General Alaya is a member of several professional bodies, including Nigerian Society of Engineers and Chartered Institute of Public Diplomacy and Management.

Brig. Gen. Engr. Moyosore Che Akin-Ojo, MNSE

Commander 41 Engineer Brigade, Kaduna.

Engr. Moyosore Che Akin-Ojo started his Engineering career at the Nigerian Defence Academy where he graduated with a Bachelor of Engineering degree in Electrical Engineering (First Class Honours) in 2000. Being an ardent seeker of knowledge, he furthered his education with an Advanced Diploma in Combat Engineering from the Nigerian Army School of Engineering (NASME), Makurdi, a Masters in Military Arts and Sciences from the USA, a Masters in Security, Development from the Bangladesh University of Professionals and a Strategic Leadership Programme Certificate from Kings College London. He has also attended several training courses both in Nigeria and abroad in Military Arts and Sciences, Explosive Ordnance Disposal, Combat Engineering, Logistics and Management, Bridge Classification, Military Strategy, Wargaming and Higher Defence Strategy and Management.

Engr Akin-Ojo is a COREN Registered Engineer, where he served on the Council as the Armed Forces of Nigeria representative for over 2 years. He is also a Fellow of the Nigerian Society of Engineers and a fellow of the Order of Good Times of Nova Scotia, Canada.

A keen and passionate scholar, he served as an instructor in Depot Nigerian Army, training recruits in Field Engineering for 3 years. He was also a Directing Staff at the Horton Academy, the Republic of Sierra Leone Armed Forces Leadership and Staff College under the auspices of the British Military Advisory and Training Team (BMATT) and a Directing Staff and Coordinator, Wargaming Centre, at the prestigious Army War College Nigeria in Abuja. He has written and presented several technical papers at both local and international fora. Some of his papers are:

- Harnessing Emerging Technologies for Optimal Combat Engineering Support to the Nigerian Army.
- Military Dimension of the Niger Delta Crisis: Increasing the Effectiveness of Security Forces Through Information Operations.
- Military Innovation and Nigerian Army Counter Terrorism and Counter Insurgency Operations.
- Systems Thinking in Nigerian Army Operations.

An accomplished Electrical Engineer and Brigadier General in the Nigerian Army, Engr. Akin-Ojo is currently the Commander, 41 Engineer Brigade, responsible for construction and maintenance of all Nigerian Army barracks, structures and facilities in 1 Division Area of Responsibility covering Kaduna, Kano, Jigawa and Niger States. He has undertaken various construction projects including design and construction of Muhammad Abu-Ali Range in Sambisa Forest in 2017, construction and remodelling of Ojo Cantonment Medical Centre, Lagos, construction of 60-room 2 - storey Young Officers' Course Hostels at the Nigerian Army School of Infantry, Jaji as well as the design and construction of shooting range, armoury and magazine at Litani Barracks, Bida. He is currently directing a host of construction projects in the aforementioned states.

Engr. Akin-Ojo is a stickler for excellence and integrity; values he believes are much needed in the engineering profession and which he instils in his subordinates. He has always upheld the values and ideals of the NSE and serves as a beacon of light for the Society in the Armed Forces where he is highly spoken of. He is happily married to Mrs Ebowo Akin-Ojo, a leadership coach and consultant, and the union is blessed with 3 children. At his leisure, he enjoys spending time with his family, reading and strategic wargaming.

Engr. Dr. Babatope Kayode

Petroleum Engineering Specialist, Saudi Aramco

Babatope Kayode is an SPE certified Petroleum Engineer, having 25 years of industry experience. He joined Saudi Aramco in Nov-2014, after 13 years of reservoir simulation career at TotalEnergies.

He was born and raised in Ado-Ekiti, Ekiti-State, Western Nigeria, where he had his Primary and Secondary education, after which he proceeded to University of Ibadan to obtain his Bachelors in Petroleum Engineering. He currently holds both PhD and MBA degrees from Heriot-Watt University, and a corporate member of the Nigerian Society of Engineers. He has filed over 20 inventions with the USPTO, of which 8 have been granted patents rights. He is author of over 25 technical publications, and recently published books "Journey of the Barrel", and "In the Beginning, there was a Big Bang"

Engr. Dr Babatope Kayode currently works as Petroleum Engineering Specialist at Saudi Aramco, developing tools and methodologies for constructing and calibrating reservoir models, and the utilization of such calibrated models to efficiently forecast future production profiles under uncertainty.

Engr. Chichi Emenike, FNSE

Acting Managing Director Neconde Energy Limited and Gas Asset Manager

Engr. Chichi Emenike has over twenty six (26) years experience in the Oil and Gas Industry spanning across the upstream, midstream and downstream sectors. She holds a Bachelors in Engineering and an MBA in Oil & Gas Management from Robert Gordon University, Aberdeen plus is a Fellow of Nigerian Society of Engineers (NSE), a certified member with the Council for The Regulation of Engineering in Nigeria (COREN), Association of Professional Women Engineers of Nigeria (APWEN) and a founding member Women In Energy Network (WIEN).

She started her early career in the Nigerian Oil & Gas industry as a Project Engineer with Exxon Mobil Nigeria in 1999 and is currently on OML42 in Nigeria in Neconde Energy Limited as the Acting Managing Director as well as the Gas Asset Manager where she is responsible for consolidating and increasing the Asset's current production of Gas and Crude with a focus on workovers, drilling campaigns and facility uptime with KPOs of value optimization for growth and profitability. She was one of the key leads on the team which secured and signed a Finance, Technical and Services Agreement (FTSA) on OML42 in 2022 which will have investments and injection of financing into the development of the Asset over a fifteen (15) year period.

On the other hand with the Asset's keen focus on Gas, she is also responsible for driving the company's Gas business and positioning Neconde as a lead player for developing Gas supply in with the company's strategic mandate. One of her core focus is around unlocking the Asset's potential of over 3.8tcf of Gas reserves for increased value optimization for growth and profitability.

Apart from being involved in several technical projects along different parts of the value chain of the industry, she has been engaged in several Corporate Social Responsibility Projects, advocating inclusion and diversity and its relevance to business sustainability as well as serving on different Not-for profit organizations and NGOs. These include but are limited to limited to the Nigerian Gas Association (NGA) (Study Chair of its Diversity, Equality and Inclusion Group), Women in Energy Network (WIEN) as Vice President, Upstream, Society of Petroleum Engineers (SPE) and others. She remains committed to actively creating opportunities especially for women in Oil and Gas projects whilst also providing Commercial, Technical and Financial advice for women who are seeking to actively participate in the Upstream Oil & Gas industry.

NSE Embraces Dorman Long Engineering for Capacity Building and Collaboration

Engr. Oguntala being received by Governor Zulum in Government House Maiduguri on Wednesday, December 4, 2024. The President was accompanied by the Executive Committee Members and the Resource Persons

The Nigerian Society of Engineers (NSE) has officially welcomed a proposal from Dorman Long Engineering Limited aimed at fostering collaborations in capacity building and enhancing networking opportunities to strengthen engineering activities within the country. Dorman Long Engineering, which has significant interests in the oil and gas sector and related industries, is seeking to cultivate closer ties with the NSE as part of a strategic initiative to increase its visibility and establish a recognised identity within Nigeria's engineering community.

This partnership is expected to facilitate knowledge sharing, skills development, and the exchange of best practices among engineering professionals, ultimately contributing to the advancement of the sector. Both organisations recognise the importance of building a robust engineering workforce to meet the challenges facing Nigeria's infrastructure and development needs. Through this collaboration, they hope to enhance professional standards, promote innovation, and support the growth of engineering initiatives across the country.

Speaking, Friday, January 17, 2025, at the National Engineering Centre (NEC) Headquarters in Abuja, during a courtesy visit to the President of the Nigerian Society of Engineers (NSE), Engr. Margaret Aina Oguntala,FNSE, the Managing Director of Dorman Long Engineering Limited, Engr. Chris Ijeli, MNSE, stated, "Our purpose here is to pay a courtesy call and bring Dorman Long Engineering Limited closer to the Nigerian Society of Engineers. While we have undertaken significant engineering projects, we recognise that we have not been closely associated with the engineering community, the Nigerian Society of Engineers. We've accomplished numerous projects, including the Niger Bridge and various oil and gas initiatives, which are noteworthy. However, we believe it's essential to connect these achievements to

the engineering sector to foster articulated programmess that will further promote and embed engineering practices within Nigeria."

Engr. Ijeli highlighted that Dorman Long desires a more meaningful relationship with the Nigerian Society of Engineers that extends beyond fabrication and construction to research and development. He emphasised the importance of investing in the development of Nigeria's engineering capacity, which Dorman Long aims to achieve by building collaboration and training Younger Engineers. The Managing Director expressed Dorman Long's willingness to support the education and development of Young Engineers through internships, hands-on training, and institutional partnerships through NSE.

Engr. Ijeli recounted a challenge from a client to build the tallest Christmas Tree in Africa within a stringent 52-day timeline, which they successfully completed. He stressed that as a pioneering engineering firm in Nigeria, Dorman Long recognises the need to give back to the community and invest in the future of engineering in Nigeria. Engr. Ijeli concluded by inviting cooperation and collaboration between Dorman Long and the Nigerian Society of Engineers to tackle the various facets of engineering and drive Nigeria's progress forward.

The President of the Nigerian Society of Engineers (NSE), Engr. Margaret Aina Oguntala, FNSE, expressed her support for the initiative proposed by the Managing Director of Dorman Long Engineering Limited. She noted that this collaboration could serve as a cornerstone for strengthening the relationship which has spanned over a decade. Engr. Oguntala emphasised the importance of fostering such partnerships to advance engineering practice and contribute to the development of the industry in Nigeria. According to the NSE President, "In 2014, it was during the tenure of Engr. Ademola I. Olorunfemi, FNSE as President

of NSE and I was a Vice President then, we paid a courtesy call on the Management of Dorman Long Engineering Limited in Lagos. It was more of an industrial visit actually, that's about 11 years ago. Now, of course, we are building on that relationship that started in 2014; we are bringing it forward to today, January 17, 2025. We are indeed very delighted that you are here today. When I was told you were coming, I told the Deputy President to also be on standby and the entire management of NSE, to receive you and your team. That shows the high esteem we accord you and the company because we know the track record of Dorman Long Engineering. Some of us started hearing about Dorman Long Engineering for many years before we even became Engineers. Dorman Long Engineering is synonymous with Nigeria, that's why we are happy to have you here".

The President disclosed the ongoing plans by the Nigerian Society of Engineers to establish practicals workshop. The workshop, according to her, will have advanced equipment that will provide valuable internship opportunities for engineering students for practical knowledge. Additionally, it will serve as a platform for young engineering graduates to hone their skills. Dorman Long Engineering Limited expressed willingness to fully support in the establishment of the workshop, highlighting a collaborative effort to boosting practical knowledge.

The President noted that the request from Dorman Long Engineering Limited aligns seamlessly with the aims and objectives of the Nigerian Society of Engineers. She emphasised that NSE is committed to enhancing the professional capacity and overall wellbeing of Nigerian Engineers. Thus, the area of collaboration being explored is not only appropriate but also feasible.

Group Picture

A Society That Desires Development Cannot Take Engineers for Granted - *SGF*

President of the Nigerian Society of Engineers, Engr. Margaret Aina Oguntala, FNSE, presenting a plaque to the Secretary to the Government of the Federation (SGF), His Excellency, Senator Geroge Akume, CON

The Federal Government has reaffirmed its commitment to collaborate with the Nigerian Society of Engineers (NSE) to drive engineering infrastructure development and technological advancement in Nigeria. This declaration was made by the Secretary to the Government of the Federation (SGF), His Excellency, Senator Geroge Akume, CON, during the official visit to his office by the President of NSE, Engr. Margaret Aina Oguntala, FNSE, on Thursday, January 30, 2024.

During the meeting, the NSE President presented NSE's request for full sponsorship of its proposed Innovation Hub, which is designed as a technology incubation and product development centre. This initiative aims to adapt existing technologies and research projects under an academia-industry project exchange framework to produce commercially viable products. She explained that the Innovation Hub is modelled after Taiwan's transformation into a semiconductor powerhouse, emphasising the role of policy backing and financial support from the government in achieving this vision.

The NSE President also took the opportunity to advocate for the long-standing request for the institution of an Engineering Salary Scale or an Enhanced Entry Point for Engineers in public service, proposing that Engineers' Entry Point should not be less than Grade Level 10. She urged the SGF to take a decisive action on this matter to enhance the morale and boost the productivity of Engineers across the country.

Additionally, Engr. Oguntala raised concerns about the appointment of non-Engineers into engineering positions in agencies such as the River Basins Development Authorities (RBDAs). She called for corrective measures to ensure that only qualified Engineers are appointed

to such roles, which are crucial to national development.

Another key request from NSE was for the SGF to facilitate a courtesy visit by NSE to President Bola Ahmed Tinubu, GCFR, to discuss NSE's role in Nigeria's infrastructure revolution. The NSE President emphasised NSE's capacity to provide expert guidance on national engineering and technological policies, as well as offer strategic advice on efficient resource allocation for sustainable national development.

In response, Senator Akume first congratulated the NSE President for the feat of becoming the first female President of the Society with a history of over three decades, describing it as a remarkable achievement. Sen. Akume assured Engr. Oguntala that the Federal Government is fully committed to working closely with NSE to drive national development. He acknowledged the importance of engineering and technology in advancing the country's economic and infrastructural landscape.

"A society that wants to develop cannot take for granted the inputs of Engineers. I have travelled a lot and have seen the works of Engineering. Engineers in Nigeria are also good innovators and we are proud of your achievements. I encourage you to continue pushing for the professional development and welfare of your members. I have some seasoned technocrats here with me, including the Permanent Secretary, Ecological Fund and the Director, Office of the Secretary to the Government of the Federation and we have listened carefully to your requests. We will do what we can to support your initiatives", the SGF further said.

Group Photograph

Gov. Zulum Hosts The 2024/2025 NSE Exco Retreat

Engr. Oguntala being received by Governor Zulum in Government House Maiduguri on Wednesday, December 4, 2024. The President was accompanied by the Executive Committee Members and the Resource Persons

Following on the heels of his physical attendance of the 2024 International Engineering Conference, His Excellency, the Executive Governor of Borno State, Engr. Prof. Babagana Umara Zulum, CON, FNSE, mni, made good his promise of hosting the combined Retreat organised by the NSE headquarters for the 2024 and 2025 National Executive Committee (EXCO) members.

Between December 1st and 4th, 2024, members of the 2024 and 2025 sets of the NSE EXCO converged in Maiduguri for the Retreat programme. It was organised to ensure seamless and effective transition between the old and new sets, give clear understanding of roles and assignments for the newly elected officers, as well as to warrant the imbibement of the strategic direction of the Society.

The programme of activities included an elaborate opening ceremony where the Secretary to the State Government (SSG), Hon. Bukar Tijjani, declared the Retreat open on behalf of the Executive Governor. Other senior members of the State Executive Council and some members of the Maiduguri business community graced the grand occasion coloured with creative performances by the State cultural troupes. There were also were guided technical tours of selected legacy project sites around the metropolis. Sites visited include the Borno State University Teaching Hospital, the North-East Development Commission (NEDC) headquarters building and a flyover/interchange/road construction project at the West End part of the metropolis.

The resource topics for the retreat were "Structure, Hierarchy and General Administration of NSE" facilitated by the Executive Secretary, Engr. Joshoa Egube, FNSE; "Code of Conduct, Protocol and Ethics" by Past President, Engr. Kashim Abdul Ali, FNSE, FAEng, mni; "Roles of EXCO vis-s-vis Branches & Divisions" by Engr. Prof. Joshua Olaoye, FNSE; "Introduction to the NSE Strategic Agenda" by COREN Vice President, Engr. Olaolu Ogunduyile, FNSE; as well as the specific fundamentals of the NSE Strategic Agenda, taken in segments by Engr. Babatunde Odunlami, FNSE, Engr. Akintunde Atanda, FNSE and Engr. Tosin Ogunmola, FNSE.

...Offers to Host the 2026 Engineering Conference

To mark the end of the Retreat, His Excellency, Gov. Babagana Zulum, FNSE, hosted the NSE President and her team to a special dinner at the Government House. While addressing his guests at the event, the Governor thanked Madam President for choosing Maiduguri as the location for the combined Retreat and for the moral and technical support that his administration has been receiving from the Society. He also reiterated his passion for Continuing Professional Development and urged the leadership of NSE to

prioritise CPD as the bedrock for professional excellence and sustainable development.

In capping his remarks, Gov. Zulum pledged to continue his support for NSE and engineering development in Nigeria and to attend the 2025 Engineering Conference in Ibadan. Then, he profoundly declared his administration's readiness to host the 2026 International Engineering Conference, Exhibition and Annual General Meeting in Maiduguri, Borno State.

In a special appreciation message to the Governor, the NSE President, Engr. Margaret Aina Oguntala, FNSE said:

"Your Excellency, the thoughtful and generous support gestures that you have continually extended to the NSE do not only reflect your personal commitment to the cause of the Society but also underscore your dedication and vested interest in advancing engineering excellence…

"The inspiring leadership that you provide, backed by your professional integrity and humane disposition, is a model of encouragement to Nigerian Engineers and was amply exemplified in some of the modules of the retreat. I assure Your Excellency that your personal charge on CPD for Engineers and other insights shared during the retreat have equipped us with valuable perspectives as we prepare for the years ahead.

Governor Zulum (left) addressing the NSE President and her team at the dinner

2nd from left, President of the Nigerian Society of Engineers, Engr. Margaret Aina Oguntala, FNSE, flanked on her left by the Secretary to the State Government, Hon. Bukar Tijjani who was on hand to receive the NSE Team on behalf of the Governor at the Opening Ceremony for the Retreat, on his left is Deputy President of NSE, Engr. Ali A. Rabiu, FNSE, FAEng, MFR, 1st from left is the representative of the Speaker of the Borno State House of Assembly, Engr. Mohammed Gabomi Marte, FNSE

"I would like to inform Your Excellency that your positive disposition towards further collaborations, particularly the hosting of the 2026 International Engineering Conference, has strengthened our resolve to continually strive to address societal challenges with innovative engineering solutions for social, economic and technological advancement".

Visit by the NSE Team to the North East Development Commission (NEDC) Corporate Headquarters construction site.

Inauguration of 2025 Boards, Committees: NSE President Emphasises Alignment with Strategic Agenda

President of the Nigerian Society of Engineers, Engr. Margaret Aina Oguntala, FNSE

The President of the Nigerian Society of Engineers (NSE), Engr. Margaret Aina Oguntala, FNSE, has officially inaugurated the 2025 Boards and Committees, charging the Chairmen to prioritise actionable submissions that will guide the Executive Committee's decision-making. She further emphasised the importance of consistent reference to the NSE Strategic Agenda Document as a compass for achieving the Society's vision for national development.

Engr. Oguntala noted that the composition of the 2025 Boards and Committees is in full compliance with the provisions of the revised Memorandum and Articles of Association (2024).

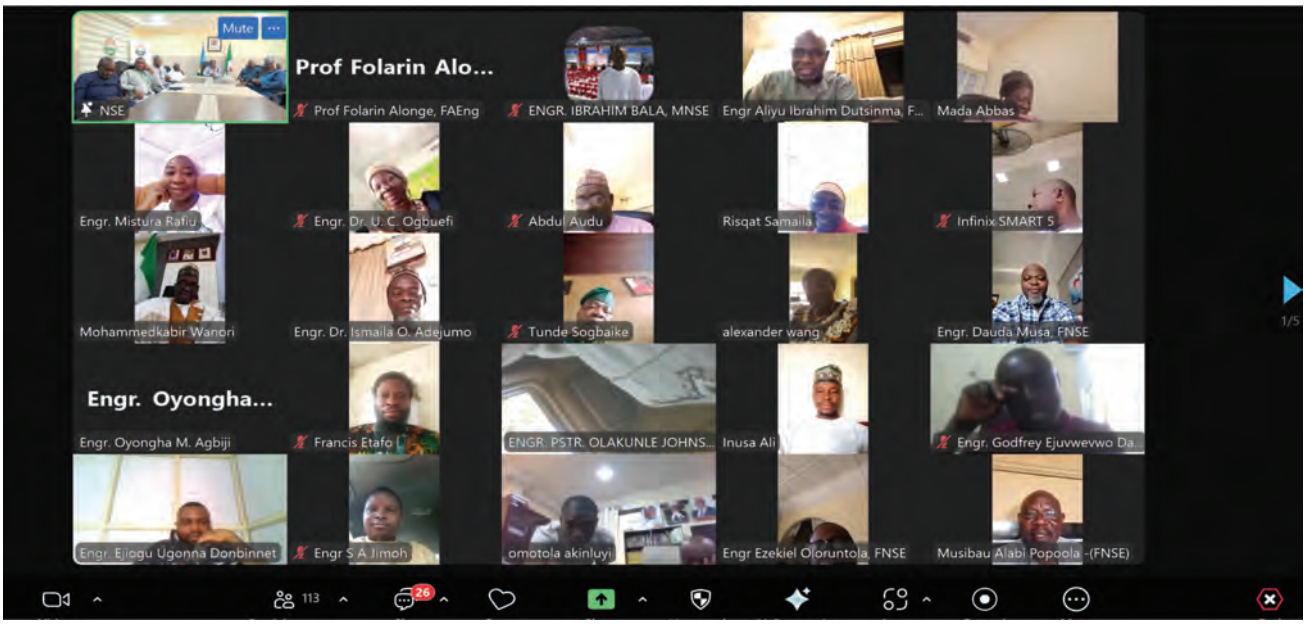
She described the selection as strategic and a deliberate effort to leverage the immense wealth of experience among members, thus enhancing the Society's capacity to achieve its goals and advance to new heights.

"I encourage all Chairmen of the Boards and Committees to make frequent reference to the NSE Strategic Agenda Document. This document has been and will continue to be our compass, guiding our strategies and ensuring alignment with the Society's vision for national development", Engr. Oguntala stated.

She highlighted the critical role of Boards and Committees within the Society, stating, *"They are the bedrock of proactive leadership, providing necessary frameworks and actionable blueprints to drive our objectives in a coherent and logical manner."* She added, *"We rely on you to continually assess and, when necessary, retool our ideas to ensure we promote good governance and make meaningful impacts on national development."*

She pointed out that a very key takeaway from the event was a reminder to all members of the importance of our financial responsibility to the Society. *"Our Society thrives on the support of its members and prompt payment of dues is a fundamental obligation that enables us to execute our programmes effectively. I therefore, urge all distinguished members of the Boards and Committees to ensure that they are up to date financially".*

The President further said that the call was necessitated by the high number of members who have outstanding dues to pay saying "I would like *to implore all of us who are going to lead the Society from within the Committees to lead by example by paying your dues not later than the first*



Members of the Committees on Zoom

week after this inauguration. This will encourage others to follow suit in fulfilling their financial commitments to the Society".

The President charged the Board Chairmen to effectively organise their members, ensuring active and constructive participation in decision-making processes. She urged them to manage deliberations with a clear focus on the Society's overarching goals, ensuring discussions are aligned with achieving the primary objective of the Society.

Acknowledging current challenges, the President encouraged the use of Information Technology (IT) for efficiency and cost-effectiveness. *"In light of present-day challenges, I urge all Board and Committee Chairmen to take full advantage of IT resources at our disposal. Utilising online platforms for meetings will help reduce costs and mitigate the risks associated with physical travel, it is imperative that we adopt these cost-effective and efficient measures to support our operations".*

After the inauguration, the President gave room for remarks by selected Chairmen of a few Boards and Committees. Amongst those who spoke were Engr. Aliyu Ibrahim Dutsinma, FNSE, Vice President and Chairman, Membership Services Board, Past President Engr. Kashim Ali, FNSE, mni, Chairman, Election Committee, Engr. Kamila Wopa Maliki, FNSE, mni, Chairman, Board of Fellows, Engr. Kabiru Wanori, FNSE, Chairman, Regional Development Committee, Engr. Valerie Agberagba, FNSE, Chairman, International Relations Committee, Engr. Mutiu Odesanya, FNSE, Chairman, Conference Planning Committee, and Engr. Felix Nwankwo, FNSE, Chairman, Engineering Ethics, Diversity and Regulations Committee.

Left, Deputy President of the Nigerian Society of Engineers, Engr. Ali A. Rabiu, FNSE, FAEng, MFR, Right the President of NSE.

There was discernible correlation of purpose as the speakers made their remarks one after the other; showing appreciation for the opportunity to serve, giving assurances of performance by the boards and committees, promising adherence to the guiding Terms of Reference (ToRs) and pledging support for the Society's strategic agenda.

President Flags Off Cohort 2 Training Sessions for Senior, Young Engineers

President of the Nigerian Society of Engineers, Engr. Margaret Aina Oguntala, FNSE

The President of the Nigerian Society of Engineers (NSE), Engr. Margaret Aina Oguntala, FNSE today Thursday, February 6, 2025 flagged off the Cohort 2 Continuing Professional Development training programme. Declaring open the session the President said it was a great joy flagging off the event which has coincided with the Sixty-Seven (67th) Anniversary of the Society saying "Today is a special day for all of us, as it coincides with the 67th anniversary of the Nigerian Society of Engineers (NSE).

Since its establishment, our great society has remained steadfast in its mission to advance engineering excellence, promote capacity building, and contribute to national development, it is heartwarming that on this historic occasion, we are launching a capacity-building program, which is one of the core objectives of the NSE".

Engr. Oguntala said that the training was necessitated in view of rapid technological advancements consequently the need for the Nigerian Society of Engineers to ensure its Engineers remain at the forefront of digital transformation. The training according to her, is designed to equip participants with essential digital skills that will enhance their careers and contributions to national development

The President disclosed that the Society decided to plan the training in two segments. She said the first which focuses on Building Information Modelling (BIM), Artificial Intelligence (AI) and the Internet of Things (IoT) is meant for Engineers above the age of 35 years, while the aspect for the Young Engineers below 35 years would focus on Data Analytics, and Cybersecurity.

The first part of the training will be facilitated by Citadel for Technological & Engineering Development Limited (CITED). While the training on Data Analytics is for the Young Engineers will be facilitated by Techlytics. The successful candidates for the Young Engineers are 209, and Senior Engineers are 252. The successful participants were selected on the first come basis during registration.

In his welcome address, the Vice President, Professional Development, Engr. Dr. Aluya Dauda Okodugha, FNSE charged the participants to take advantage of the training to boost their skills. Engr. Okodugha told the participants to maximise the opportunity and not allow anything that will hinder their successful completion of the programme.

Speaking, Engr. Gwuche Ajaifia, FNSE representing the Mr Osagie Okunbor, country Chair of OPTS the financial sponsors of the training said they were genuinely happy to collaborate with NSE on the programme. Engr, Ajaifia pledged more partnership with NSE on behalf of his organisation.

Vice President Professional Development Engr. Aluya Okodugha Dauda PhD, FNSE

2nd from left, President of the Nigerian Society of Engineers, Engr. Margaret Aina Ogunlala, FNSE flanked on her right-hand side by the Managing Director of Citadel for Technological & Engineering Development Limited (CITED) Engr. Bola Bido, FNSE, on her immediate left by Executive Director of Oil Producers Trade Section (OPTS) Engr. Gwueche Ajaifia, FNSE and her far left, Chief Executive Officer of Techlytics, Mrs/ Oluwatayo Winkunle

Front row, 3rd from left, President of the Nigerian Society of Engineers, Engr. Margaret Aina Ogunlala, FNSE flanked on her immediate right-hand side by the Vice President (Professional Development), Engr. Dr. Aluya Dauda Okodugha, FNSE on the President's far right is the Managing Director of Citadel for Technological & Engineering Development Limited (CITED) Engr. Bola Bido, FNSE, on her immediate left by Executive Director of Oil Producers Trade Section (OPTS) Engr. Gwueche Ajaifia, FNSE and her far lest, Chief Executive Officer of Techlytics, Mrs/ Oluwatayo Winkunle with the training participants standing.

NSE, BHM Sign MoU for Communications Partnership

From left: President of The Nigerian Society of Engineers (NSE), Engr. Margaret Aina Oguntala, FNSE and Chief Executive Officer of BHM, Mr. Ayeni Adekunle, shortly after signing of Memorandum of understanding (MoU) between BHM and NSE in Lagos

A memorandum of understanding (MoU) was signed on Thursday, February 6, 2025 between the Nigerian Society of Engineers (NSE), the umbrella organisation for the Engineering profession in Nigeria and BHM, an international communications services company.

During the ceremony, the President of NSE, Engr. Margaret Aina Oguntala, FNSE and the Chief Executive Officer of BHM, Ayeni Adekunle made commitments for the two organisations to work together to develop and protect the reputation of the NSE, facilitate capacity development for media and communications professionals within the body and allied partners, as well as enhance the perception and prestige of the engineering profession in Nigeria.

Engr. Oguntala harped on the valuable partnership with BHM and emphasised the transformational significance of training, which is one of the key pillars of NSE's Membership Development Board. She shared, *"In 2014, through BHM, we were able to secure training for our media staff which changed the orientation and helped them deliver better in their job expectations. Today, we have flagged off another training for younger and older Engineers. For the Young Engineers, we are training them on Data Analytics and for the older Engineers, we are training them on digital transformation of the engineering practice. The idea is to bridge the knowledge gap."*

Ayeni, on his part, conveyed BHM's strong enthusiasm for collaboration, stating: "I have a clear understanding of the NSE President's ambition for the Society. And I am a big fan, an advocate of anything that provides opportunities for women who, in my opinion, have so much more to do and so much value to add to leadership and nation building." On visibility for the Society, he outlined, *"There is an opportunity for thought leadership and repositioning in order to attract undergraduates and Young Engineers to the NSE."*

The partnership, signed at the NSE Lagos Liaison Office, is expected to help deepen the relationship between the NSE and stakeholders in media, business and government, as well as establish and accelerate opportunities for training, partnerships and scholarship. The ceremony was witnessed by the NSE Vice President for Professional Development, Engr. Dr. Aluya Dauda Okodugha, FNSE, NSE Asst. Director, Media, Mr. Henry Iortim, NSE Lagos Liaison Officer, Engr. Eyo Idongesit, MNSE and BHM's Corporate and Legal Services teams. This partnership formalises a longstanding partnership between both organisations, underscoring a shared commitment to advancing public engagement and shaping the perception of engineering in Nigeria.

NSE Abeokuta Inaugurates Engr. Olumayowa Idowu, FNSE, as 17th Chairman

A momentous occasion unfolded in Abeokuta as Engr. Olumayowa Idowu, FNSE, was officially inaugurated as the 17th Chairman of the Nigerian Society of Engineers (NSE) Abeokuta Branch. The event, which took place at the prestigious Abeokuta Club, was graced by esteemed dignitaries, including the NSE President, Engr. Margaret Oguntala, FNSE, who chaired the occasion, and the Deputy Governor of Ogun State, Engr. Noimot Salako-Oyedele, who delivered a keynote address on the state of Nigeria's industrial sector and the pivotal role of Engineering in national development.

The Chairman Nigerian Society of Engineers Abeokuta, Engr Olumayowa Ayodeji Idowu, FNSE; The President of the Nigerian Society of Engineers, Engr Margaret Aina Oguntala, FNSE, The Deputy Governor of Ogun State, Engr Noimot Salako-Oyedele, FNSE and wife of the Chairman, Mrs Oluronke Idowu at the Inauguration of Engr Olumayowa Ayodeji IDOWU, FNSE as the 17th Chairman of the Nigerian Society of Engineers Abeokuta

The Immediate Past Chairman of the Nigerian Society of Engineers Abeokuta, Engr Ismail Adetunji Adenuga, FNSE decorating the new Chairman, Engr Olumayowa Ayodeji IDOWU, FNSE

Speaking at the ceremony, Engr. Salako-Oyedele acknowledged the significant transformation in Nigeria's industrial sector, particularly in manufacturing, construction, and energy. However, she lamented the challenges hindering its full potential, including infrastructure deficits, limited access to technology, workforce skill gaps, and regulatory bottlenecks. She emphasized that, for Nigeria to achieve sustainable industrial and technological transformation, the government must empower Engineers and foster an environment of innovation and research. She called on Nigerian Engineers to take up the challenge of problem-solving, urging them to embrace continuous learning, innovation, and advocacy for engineering leadership in national development.

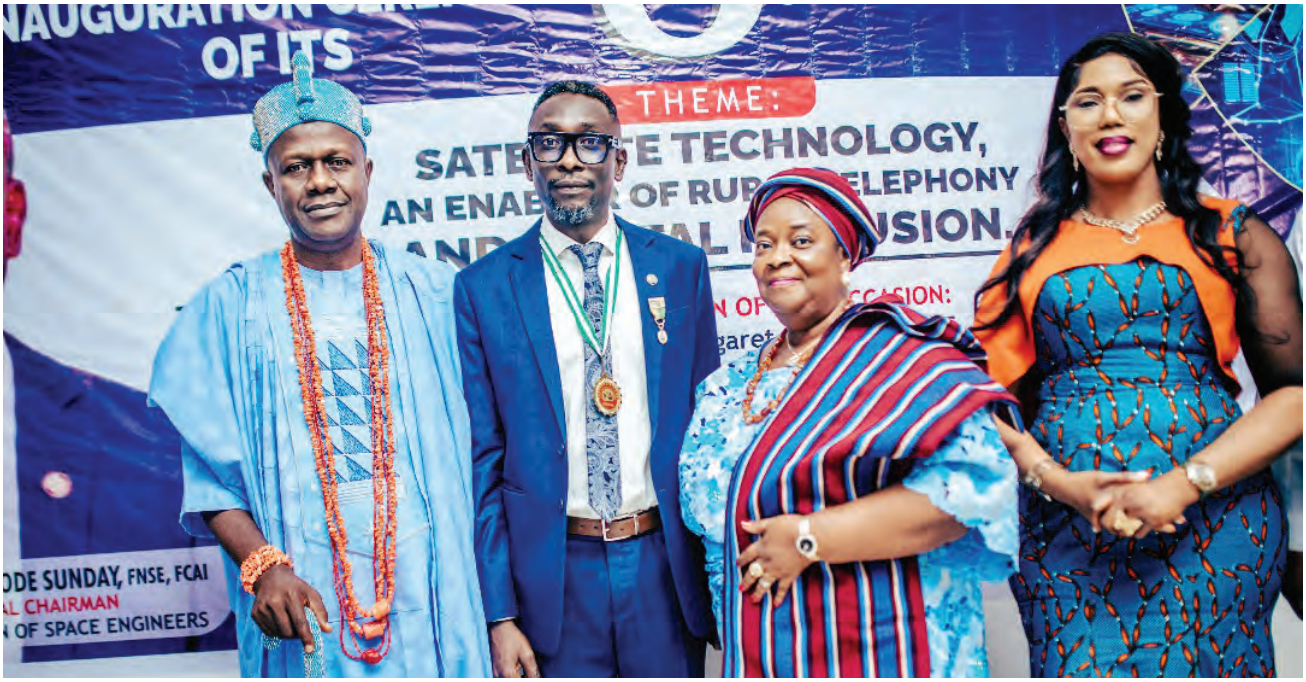
In his inaugural speech, the new NSE Abeokuta Chairman, Engr. Olumayowa Idowu, FNSE, pledged to lead with integrity, innovation, and inclusiveness. He acknowledged the contributions of his predecessors and committed to building upon their achievements to foster professional growth, enhance Engineering impact, and promote excellence.

Outlining his strategic priorities, Engr. Idowu emphasized Capacity Development, Industry & Government Collaboration, Expanding Membership Engagement, Engineering Advocacy & Community Impact and Secretariat Development

Engr. Idowu, who holds the record as the youngest Chairman in the history of NSE Abeokuta, described his emergence as a testament to the progressive vision, dynamism, and inclusivity of the Society. He reiterated that leadership is not about age but about commitment, competence, and a shared passion for Engineering excellence

In her remarks, NSE President, Engr. Margaret Oguntala, FNSE, congratulated Engr. Idowu on his well-deserved inauguration and commended the Abeokuta Branch for its commitment to excellence. She emphasized the need for Engineers to embrace innovation, digital transformation, and sustainable solutions to address Nigeria's infrastructural and industrial challenges. She further assured the new leadership of her unwavering support in advancing the Engineering profession.

THE INAUGURATION OF ENGR. BABALOLA KAYODE SUNDAY, FNSE AS THE 8TH CHAIRMAN OF THE NIGERIAN INSTITUTION OF SPACE ENGINEERS (NISE), HELD ON THURSDAY, FEBRUARY 13, 2025 IN ABUJA



From Left: The royal father of the day, HRM, Olu Anthony Bamigbaiye Idowu, CON, the Olu Adde of Ekinrin-Adde, Ijumu LGA Kogi State, the 8th National Chairman of the Nigerian Institution of Space Engineers, Engr Babalola Kayode Sunday, FNSE,FCAI, MNISEng, Olori Bridget Fehintola Idowu and Representative of NSE President, Vice President of NSE (Engineering Technology and Innovation Management) Engr. Halimat Adediran, FNSE.

Engr. Dr. Adediran and Engr. Babalola

MD/CEO of NigComSat Limited, Jane Nkechi Egerton-Idehen congratulates Engr. Babalola shortly after his Inauguration.

Engr. Nnenna Aguwa, MNSE

Chairman of the Young Engineers/Future Leaders (YEFL) Committee
Contact Information: +2348103249864, nnennaaguwa360@gmail.com
https://www.linkedin.com/in/nnenna-aguwa-34919717b

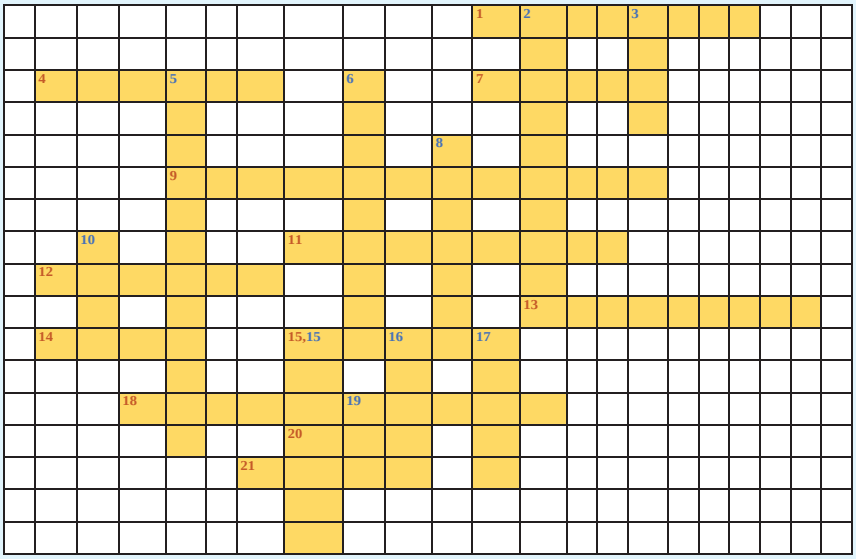
Engr. Nnenna Aguwa is a peaceful, ambitious and family-oriental woman with her personal principles drawn from daily encounter. She is a first class graduate of Civil Engineering in 2019 from the Prestigious Federal University of Technology (FUT), Minna. After graduation, she started her professional career as a trainee Civil Engineer and now, an Infrastructure/Engineering supervisor at Dantata Town Developers Limited, Abuja. Engr. Nnenna has supervised the construction and maintenance of reinforced concrete stormwater drainages, wastewater sewer pipelines freshwater reticulation systems, flexible pavement roads and buildings at various Dantata Estates (Kubwa, Gwarinpa and Karsana). She is currently pursuing a master's degree program in Structural Engineering at the University of Abuja which is now known as Yakubu Gowon University.

Engr. Nnenna Aguwa, MNSE is a registered Civil Engineer with the Council for the Regulation of Engineering in Nigeria (COREN), an active member of the Nigerian Society of Engineers (NSE), Young Engineers Forum of Nigeria (YEFoN), Nigerian Institution of Civil Engineers (NICE), Association of Professional Women Engineers of Nigeria (APWEN) and the National Institute of Professional Engineers and Scientists (NIPES). She had volunteered in serving the Engineering community as a committee member in NSE Abuja Branch Stakeholder's workshop and Induction (2023 - 2024), NICE Abuja chapter Assistant Technical Secretary (2022 – 2024), and 2023 NICE International conference/AGM LOC. Her service in the Engineering community started way back from FUT, Minna where she served as Vice President of the Nigerian Institution of Civil Engineers Students' Affiliate (NICESA) in 2016 and 2017. Now, Engr. Nnenna Aguwa, MNSE is elected as the 2025 Representative of the YEFoN in the NSE Council and the Chairman for the Young Engineers/ Future Leaders (YEFL) Committee. Her love, passion, and commitment to service to life in general is unwavering.

Engr. Nnenna Aguwa is a dedicated member of ECKANKAR, The Path of Spiritual Freedom and loves to explore her highest potential as Soul, a divine spark of God. Thank you!

The Nigerian Engineers

Puzzle 2025 Feb A:



Across		Down	
1	That portion of a process stream that has not yet entered the system or unit under consideration.	2	The act of converting material from one form into another desired form.
4	The amount of power drawn from the circuit connecting the secondary terminals of an instrument transformer, usually expressed in volt-amperes.	3	Nor widely known, not frequently used or experienced.
7	The rate of doing work.	5	All activities that involve efficient movement of finished products from the end of the production line to the consumer.
9	The process of transferring a signal, message, picture, or other form of intelligence from one location to another location by means of wire lines, radio, light beams, infrared beams, or other communication systems.	6	Point in the oil production process that falls between upstream and downstream
11	The column of drill rods, with the drill bit attached to the end.	8	Mechanical treatment of materials to produce a powder, to change the size or shape of metal powder particles, or to coat one powder mixture with another.
12	A thin sphere of liquid enclosing air or another gas	10	Used to say that one is leaving
13	The processes of receiving natural gas from wells and delivering the volumes of natural gas to gas-processing, treating or delivery facilities	15	To put a feeling, idea or principle gradually in someone's mind.
14	To form a liquid or plastic substance into a fixed shape by letting it cool in the mould.	16	A group of components such as antennas, reflectors, or directors arranged to provide a desired variation of radiation transmission or reception with direction.
15	A visual representation of something	17	To make law
18	Portion of a product stream that has already passed through the system; that portion located after a specific process unit.	19	A number that is one more than nine.
20	An aromatic beverage prepared by pouring hot or boiling water over curing of fresh leaves camellia sinensis.		
21	A conducting wire, cable, or circuit for making connections between pieces of electrical apparatus.		

DR. L.A IKPEA
Chairman/CEO

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The Nigerian Society of Engineers

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IBADAN 2025



— Theme —

ENGINEERING INNOVATION FOR A SUSTAINABLE BLUE ECONOMY

DATE: MONDAY 1ST - FRIDAY 5TH DECEMBER, 2025
VENUE: THE INTERNATIONAL CONFERENCE CENTRE, UNIVERSITY OF IBADAN, OYO STATE.

CONFERENCE FEES:

EARLY BIRD
1ST FEB. - 31ST AUG. 2025

Fellow	N120,000
Delegate	N75,000
Spouse	N25,000
Graduate / Student	N20,000
Virtual Attendee	N60,000
International Delegate	$500

LATE REGISTRATION
Sept. 1, - Nov. 23, 2025

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Graduate / Student	N25,000
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