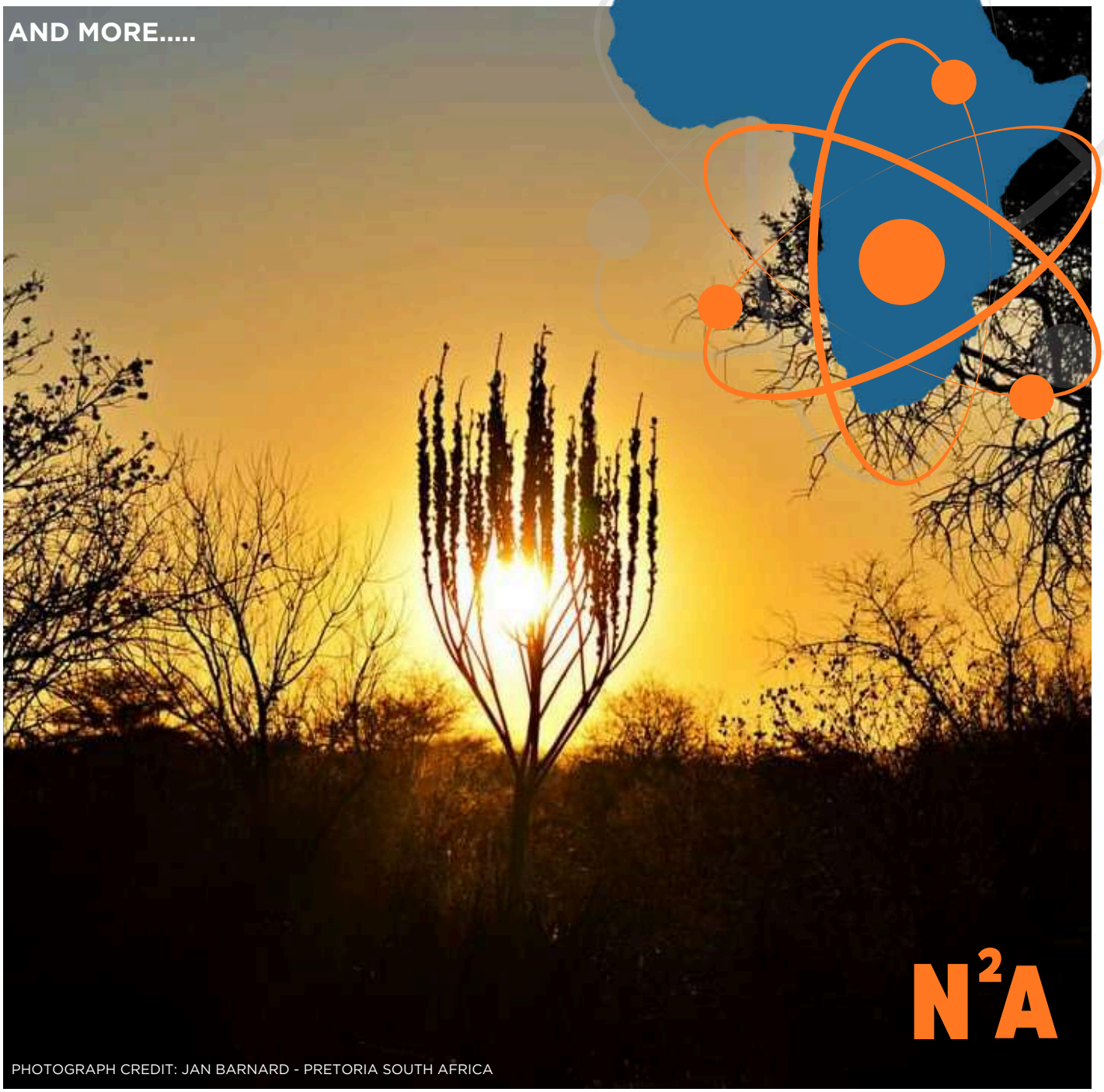
NUCLEAR NETWORK AFRICA

THE WORLD OF NUCLEAR

THE MYTH: WIND AND SOLAR ARE ENVIRONMENTALLY FRIENDLY – NUCLEAR IS NOT
DR JOHN LEDGER

SMALL MODULAR REACTORS: A NEW ERA FOR AFRICA'S ENERGY LANDSCAPE
DR UGOCHUKWU UGBOR

AND MORE.....



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N²A HIGHLIGHTS

ABOUT STRATEK GLOBAL

A Vision for Sustainable Energy Solutions

Stratek Global, a forward-thinking energy firm, was founded by a team of developers who were originally part of South Africa's Pebble Bed Modular Reactor (PBMR) project. The PBMR initiative, which aimed to create a cutting-edge, modular nuclear reactor using helium gas as a coolant and pebble-like fuel, was an ambitious attempt to revolutionize nuclear energy production. However, due to the global financial crisis and a shift in government priorities in 2008, the project was placed on hold. In the wake of this setback, Stratek Global emerged with a renewed commitment to develop a next-generation variant of the PBMR concept.

At the heart of Stratek Global's objectives is the drive to offer scalable, safe, and environmentally friendly energy solutions. The company's main goal is to contribute to a sustainable energy future by advancing nuclear technology, particularly through the development of Small Modular Reactors (SMRs) and other innovative technologies. These reactors are designed to be more flexible, efficient, and safer than traditional nuclear reactors, offering a reliable alternative to carbon-intensive energy sources such as coal and oil.

Stratek Global operates under a core set of principles, which guide its operations and innovations. Firstly, safety is paramount. The company's technologies prioritize the safety of people and the environment, ensuring that the risks associated with nuclear power are minimized through robust design and operational standards. Secondly, Stratek is committed to innovation. Leveraging its PBMR legacy, the company continually pushes the boundaries of nuclear technology, exploring new methods and approaches that can deliver cleaner, more efficient power.

Additionally, Stratek Global emphasizes sustainability. The world's energy needs are growing, and the company seeks to offer solutions that not only meet demand but do so in a way that is environmentally responsible. By reducing reliance on fossil fuels and enhancing nuclear technology's safety profile, Stratek Global aims to support the transition to a low-carbon economy.

Stratek Global stands as a symbol of resilience and ingenuity in the energy sector. By focusing on the future of nuclear power and staying true to its founding principles, it aims to play a crucial role in shaping a cleaner, more sustainable energy landscape for generations to come.

FROM THE EDITOR

Welcome to the second edition of Nuclear Network Africa N²A where we focus on the critical topic of sustainability, particularly the role of nuclear power in driving environmental sustainability across Africa. In this edition, we explore how nuclear technology can provide clean, reliable energy to meet the continent's growing demand while reducing its carbon footprint.

We are thrilled to introduce contributions from leading experts in the field, including Dr. Ugbor Ugochukwu, Sethakgi J. Kgomo and Dr John Ledger

A heartfelt thank you to all our writers for their insightful perspectives and dedication to advancing Africa's energy future.

Heather Veldhuis

HEATHER VELDHUIS
EDITOR

STRATEK GLOBAL
ADVANCED ENERGY SOLUTIONS

A FACTUALLY AND SCIENTIFICALLY GROUNDED ARGUMENT IS REQUIRED TO MAKE A COGENT BUSINESS CASE FOR NUCLEAR ENERGY

SETHAKGI KGOMO

The quest for rapid re-industrialization of South Africa (with anticipated positive economic spinoffs) will always be enabled by the country's willingness to build a sustainable energy capacity. The energy mix that is contained in the South African government's Integrated Resource Plan presents, within that broad energy mix, a golden opportunity to explore and realize the positive gains of nuclear energy, in the face of an aggressive anti-nuclear campaign waged across the world.

It is definitely most pleasing that the Minister of Electricity & Energy, Dr Kgosientsho Ramokgopa, publicly announced on 14 September the government's firm commitment to embark on an additional nuclear energy build in South Africa, against the background of the damaging effects of long years of loadshedding. This is an encouraging development, particularly that there will be full public participation in order for Government to determine the country's acceptance of nuclear power. *We will", says the Minister, "carry out an honest and comprehensive public engagement". The public has every right to know the truth about nuclear-powered energy, that it is derived from a cheaper, safer and more sustainable energy source, compared to the much-promoted renewables, like solar and wind which have proven to be expensive but still not a sustainable or reliable independent source. South Africa's Koeberg Nuclear Power Station, which ranks amongst the best in the world, is an excellent showcase of how South Africa can benefit from a new nuclear energy build.

The Minister also emphasised that the country needs to pay attention to the views of the recognised nuclear professionals, and not only hear the views of self-styled energy experts. He said that anti-nuclear activists drag the debate into the mud where they then use emotion to confuse the public. He emphasised that we need a sensible academic debate to correctly inform the public. The Minister said: “In South Africa, choices about the energy mix will be based on evidence without emotion.”

The time is thus opportune to confront an elephant in the room, the untested anti-nuclear claims peddled by those groups that oppose nuclear, but do so without providing a scientific foundation.

I add my voice to calling upon all professionals, organized business, labour unions, as well as forward-looking NGOs to promote the positive potential of nuclear power. Additional nuclear energy should be seen as adding to the traditional baseload power generated from coal and the existing nuclear contribution, and therefore providing the required energy security of supply. This it does on a basis of guaranteed reliability which our industrialization so desperately needs.

In order to make a convincing business case for nuclear: -

The voice of nuclear professionals must be heard, rather than hearing only the self-styled energy experts who appear often in the media. The self-styled energy experts, in the words of the Minister, operate "in the mud" with "emotional arguments" without a factual foundation.

The general media should endeavour to present a balanced picture that reflects the truth as told by the knowledgeable people rather than relying on the emotional ramblings of the greenie anti-nuclear extremists.

The voices of organized business, organized labour and the broad NGO sector will certainly add to the positive gains the country can derive from the envisioned nuclear build program. After all, these organizations are stakeholders who are directly affected by the economics of energy demand and supply.

The Department of Electricity and Energy should also realise that the envisaged public engagements should not just be about quoting legislation and resolutions adopted, but these engagements must be directly tailored in the layman's language. Any layman will be interested in the spinoffs from nuclear builds in terms of employment opportunities and the sustainable supply of electricity to households.

Minister Ramokgopa should be applauded for his firm and confident stand.

Sethakgi Kgomo (ensp)

Mr Kgomo is a Corporate Governance Practitioner and Legal Analyst based in Johannesburg. He has had an interest in nuclear power matters for some years.

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ENOUGH SAID??

JENNIFER M. GRANHOLM

Extracts from a speech given by US Secretary for Energy, Jennifer M. Granholm, on the occasion of the startup of Vogtle Unit 4 nuclear reactor in Waynesboro, Georgia, on 31 May 2024

This completion of Unit 4, as everybody has said, makes this the largest nuclear power plant, the largest producer of clean energy, and the largest producer of electricity in the United States.
Each year, Units 3 and 4 are going to produce enough clean power to power 1 million homes and businesses, enough energy to power roughly 1 in 4 homes in Georgia.

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To reach our goal of net zero by 2050, we have to, at least, triple our current nuclear capacity in this country. That means we've got to add 200 more gigawatts by 2050.

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But you know, we have built and secured $3.4 billion to build this entire uranium fuel strategy in the United States, so that we're not reliant on Russia for Low-Enriched Uranium [LEU] or High-Assay Low-Enriched Uranium [HALEU].

We are the ones keeping the—we are hoping that you're the ones, I'll say—keeping the existing fleet online. But we're helping, because for all of these facilities, we have a civil nuclear credit of $6 billion dollars, from the Bipartisan Infrastructure Law.

Bottom line is, in short, we are determined to build a world-class nuclear industry in the United States, and we're putting our money where our mouth is.

THE MYTH: WIND AND SOLAR ARE ENVIRONMENTALLY FRIENDLY – NUCLEAR IS NOT

DR JOHN LEDGER

Anti-nuclear organisations in South Africa promote the notion that electricity generated by wind and solar is environmentally friendly, and demand that this 'clean and green' renewable energy (RE) be developed instead of nuclear power

Such views are expressed by Earthlife Africa, Groundwork, the Koeberg Alert Alliance, and the South African Faith Communities Environmental Institute (SAFCEI), the four most vociferous anti-nuclear organisations in our part of the world. The first two are registered as Non-Profit Organisations (NPOs); the last two are not.Financial reporting by all four is opaque, at best. Groundwork is part of Friends of the Earth International; its finances are hard to disentangle from other international affiliates.

Several of these activist bodies apparently have access to generous overseas donor funding. They are quick to use the courts to pursue their aims - never a cheap exercise. The Centre for Environmental Rights (CER) seems to base its business model on litigation for these groups.

The activist views around solar and wind versus nuclear are embodied in the following extract:

"SAFCEI and Earthlife Africa stand firm in their opposition to nuclear energy, citing its financial, environmental, and social risks. They call on government to prioritise transparent and inclusive decision-making processes, ensuring that civil society voices are heard and considered. With viable, sustainable, and cost-effective alternatives like solar and wind energy available, the organisations urge a shift towards renewable energy solutions that benefit all South Africans, safeguarding the nation's future and upholding the principles of transparency, accountability and public involvement. Now, more than ever – because climate change is becoming more and more evident – it is crucial for government to rethink its nuclear ambitions and align with the growing global movement towards greener, safer renewable energy." (1)

So, renewable energy is viable, sustainable, cost-effective, greener and safer when compared to nuclear energy? There is abundant evidence that nuclear is the safest, most cost-effective, concentrated, highly regulated source of electricity generation. Solar photovoltaic (PV) cells are overwhelmingly manufactured in China. Apart from two small local assemblers, all PV modules in South Africa are imported from China. Manufacturing cells is energy intensive, involving compounds with health and environmental risks. There are valid concerns about recycling panels. Aside from silicon (Si), aluminium (Al), silver (Ag), and copper (Cu), the PV cells contain hazardous materials, including lead (Pb), cadmium (Cd) or cadmium sulphide (CdS), selenium (Se), and barium (Ba) as dopants. These can have severe effects on humans and wildlife alike, if not correctly disposed of.

Domestic and commercial roof-top PV arrays have few negative environmental impacts, but large utility-scale facilities can transform biodiversity-rich land into impoverished, erosion-prone patchworks.

Wind energy is environmentally disastrous. In 2012 South Africa had eight wind turbines – today there are around 1,800 with many more coming. These massive structures (made of steel, concrete, copper, carbon and glass fibre, plus rare earth magnets and other energy-intensive materials) are both visually intrusive in scenic landscapes, and deadly to birds and bats. The number and variety of birds killed is shocking. A study at 20 wind farms between 2014 – 2018 reported 848 dead birds comprising 130 species from 46 families, including endangered Cape Vultures and Black Harriers (2). There are now 34 wind farms with many more in the pipeline. The number of bats killed is unknown

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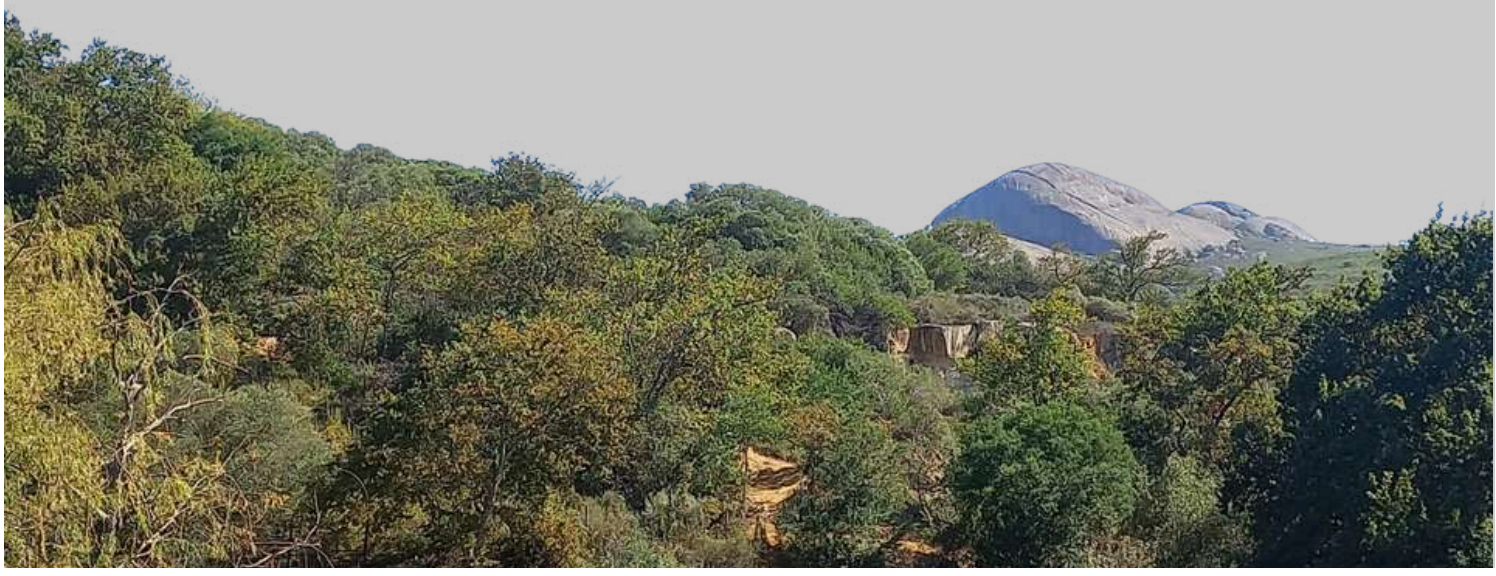
Wind developers seek out areas with good wind, often far from where electricity is needed, so powerline networks are constructed to evacuate the electricity. This exacerbates the impact of each wind farm as more birds are injured and killed by electrocution and collisions on these new lines. To add insult to injury, politicians are now bowing to demands from renewable energy developers to expand the national grid by 14,000 km at an estimated cost of US$ 21 billion (R357 billion) (3) These developers already enjoy substantial golden subsidies through their Power Purchase Agreements (PPAs) with Eskom, which has to buy every RE electron produced, whether it is required or not.

Wind and solar are certainly not environmentally, economically, functionally or socially friendly, as future generations of South Africans will discover.

(1): https://earthlife.org.za/news-civil-society-launches-legal-challenge-against-the-south-african-government-plans-for-new-nuclear-energy/
(2) Perold, Ralston-Paton & Ryan, Ostrich - Journal of African Ornithology, Volume 91, 2020
(3) https://energycapitalpower.com/south-africa-eskom-transmission-expansion/

Dr John Ledger PhD has worked in medical research, conservation, energy and academia. He is a past Director of the Endangered Wildlife Trust, and consultant on the Lesotho Highlands Water Project. He was an Associate Professor, Energy Studies at the University of Johannesburg, and a past Associate Professor at the University of the Witwatersrand. john.ledger@wol.co.za.



This is Paal Rock, the second largest granite outcrop in the world. It is near the town of Paarl in the Western Cape Province, in South Africa. It exhibits high levels of natural nuclear radiation, which would require warning signs by law, if it were a nuclear installation. It is a popular picnic area for families over weekends. The type of radiation is not at all harmful.

IS NUCLEAR POWER THE KEY TO A SUSTAINABLE ENERGY FUTURE?

ISABEL SWART

Is Nuclear Power Sustainable?

As the world faces the urgent need to find cleaner energy sources, nuclear power is often mentioned as a possible solution. However, opinions about nuclear power are mixed, with some people viewing it as a reliable and low-pollution option, while others worry about its risks and long-term sustainability. This article will explore what makes nuclear power potentially sustainable and the challenges it faces.

The Environmental Benefits of Nuclear Power

Nuclear power is often praised for producing a large amount of electricity with very little air pollution. Unlike coal, oil, or natural gas power plants, nuclear plants do not burn fuel to produce electricity, so they do not release carbon dioxide (CO2) into the atmosphere. This is important because CO2 is a major political issue in energy debates. Nuclear energy produces no CO2 at all during operations. Some people argue that the mining of Uranium should be included, but then the same for sources like wind and solar.

However, nuclear power comes with its own environmental challenges. The fuel for nuclear power plants, uranium, must be mined from the earth, and the mining process can harm the environment. Additionally, nuclear power plants produce radioactive waste that must be carefully stored and managed for thousands of years to prevent harm to people and the environment. Finding safe, long-term storage solutions for this waste is still a political problem to citizens, which needs to be solved.

Is There Enough Fuel for Nuclear Power?

Nuclear power plants use uranium as fuel. Uranium is a metal found in rocks around the world, but the type of uranium needed for nuclear power is relatively rare. Current estimates suggest that there is enough uranium to power nuclear plants for several decades, but as supplies dwindle, it will become more expensive and difficult to obtain. This raises concerns about whether nuclear power can be sustained over the long term.

To make nuclear power more sustainable, scientists are exploring new technologies that could make better use of uranium or even use different materials. For example, some reactors, known as "breeder reactors," can produce more fuel than they use, potentially extending the supply of uranium. Others are experimenting with thorium, a more common element that could be used in place of uranium. However, these new technologies are still in the research phase and may not be ready for widespread use for many years.

New Technologies for a Sustainable Future

To make nuclear power safer, cheaper, and more sustainable, researchers are developing several new types of reactors. One promising idea is the Small Modular Reactor (SMR). Unlike traditional large nuclear power plants, SMRs are smaller and can be built more quickly and at a lower cost. They could be placed in remote areas or used in combination with renewable energy sources like wind and solar to provide a steady, reliable supply of electricity.

Scientists are also working on advanced reactors known as "Generation IV" reactors, which are designed to be safer and produce less long-lasting nuclear waste. Some of these reactors use different materials for cooling and fuel, which reduces the risk of accidents and makes them more efficient. A few SMR designs are also Generation IV technology.

Another exciting area of research is nuclear fusion, which is often described as the "holy grail" of clean energy. Fusion is the process that powers the sun and stars, and if it could be harnessed on Earth, it would provide a nearly limitless source of energy with very little waste. However, practical fusion reactors are still many years away, and there are many technical challenges to overcome before they can become a reality.

Economic Challenges and Public Concerns

One of the main challenges facing nuclear power is its cost. Building a nuclear power plant requires a huge upfront investment, and many projects face delays and cost overruns. While operating a nuclear plant is relatively cheap, shutting it down safely at the end of its life, and managing the radioactive waste can be very expensive.

Additionally, the cost of renewable energy, such as wind and solar, has been dropping rapidly, making nuclear power less competitive in some cases. However a counter argument is that frequently the real costs of wind and solar are not indicated because the long range transmission costs are not included and their highly intermittent nature is not correctly included in the cost analysis.

Public perception also plays a big role in the future of nuclear power. Nuclear accidents, like those at Chernobyl in 1986 and Fukushima in 2011, have made many people wary of nuclear energy. Ensuring that new nuclear technologies are safe, and also building public trust will be essential for the future of nuclear power.

How Nuclear Power Can Fit Into a Sustainable Energy Future

Nuclear power can be a valuable part of a sustainable energy future, if it is used in combination with other clean energy sources. For example, nuclear power can provide steady, reliable electricity to balance out the variability of renewable sources like wind and solar, which depend on the weather. Small Modular Reactors could help provide power to remote communities, or industrial sites that are difficult to connect to the main electricity grid.

Conclusion

Nuclear power has the potential to be a sustainable energy source, offering low-carbon, reliable electricity. However, it faces significant challenges, such as managing radioactive waste, ensuring a long-term supply of fuel, reducing costs, and gaining public acceptance. Technological advancements, like Small Modular Reactors, and new types of nuclear reactors being developed, hold promise for addressing some of these challenges.

While nuclear power is not a perfect solution, it has an important role to play in a balanced mix of energy sources that can help meet the world's growing demand for clean, reliable electricity. The future of nuclear power will depend on continued innovation, public trust, and the ability to work alongside other sustainable energy sources.

Founder at Green Executive- Sustainability Advisor
MSc. Environmental Management
Isabel is an enthusiastic visionary with substantial experience in the Sustainability field, She is dedicated to enabling environmental responsibility and championing the cause of sustainability and compliance.

SMALL MODULAR REACTORS: A NEW ERA FOR AFRICA'S ENERGY LANDSCAPE

DR UGOCHUKWU UGBOR

Africa is on the brink of a transformative shift in its energy sector, with the rise of Small Modular Reactors (SMRs) poised to revolutionize power generation across the continent. These advanced reactors, particularly Generation IV types utilizing thorium as fuel, offer a sustainable, safe, and abundant energy solution that could address Africa's growing energy needs while ensuring environmental stewardship and security.

The Promise of Thorium and Gen IV Reactors

Thorium, a naturally occurring element, is abundant in Africa, with significant deposits being found in countries like South Africa, Egypt, and Nigeria. Unlike conventional uranium, thorium offers a proliferation-resistant pathway to nuclear energy. Generation IV SMRs, designed to be safer and more efficient than earlier reactor models, can harness thorium to produce energy with minimal waste and a much lower risk of nuclear weapons proliferation.

Thorium's proliferation resistance is one of its most compelling features. In traditional uranium reactors, spent fuel can be reprocessed to extract plutonium, which can be used in nuclear weapons. Thorium reactors, however, do not produce plutonium as a byproduct, making them inherently safer in terms of nuclear security. This is particularly significant for Africa, where adherence to the Pelindaba Treaty, which establishes the African Nuclear-Weapon-Free Zone, is paramount. The African Commission on Nuclear Energy (AFCONE) plays a critical role in ensuring that Africa remains free of nuclear weapons, and thorium-based SMRs align perfectly with these objectives.

Unified Licensing: A Key to Africa's Nuclear Future

For Africa to fully embrace the potential of SMRs, there is a pressing need for a unified licensing framework across the continent. Currently, nuclear regulation varies widely between African nations, creating barriers to the widespread adoption of SMRs. A standardized, continent-wide approach to licensing and regulation would not only streamline the deployment of SMRs but also attract international investment and expertise, accelerating Africa's path to energy security.

Homegrown Innovation: The HTMR-100

Africa is not just a passive recipient of nuclear technology; it is also a hub of innovation in this field. The HTMR-100, a Generation IV high-temperature modular reactor, is a prime example of homegrown African ingenuity. Developed by Stratek Global in South Africa, this reactor design is tailored to meet the unique energy needs of African nations. It is small, scalable, and suitable for both urban and rural areas, making it an ideal solution for a continent where energy access remains a significant challenge.

The HTMR-100's design incorporates advanced safety features and can operate on thorium fuel, making it both secure and sustainable. It is not only a solution for Africa but also has the potential to be a major export, positioning Africa as a leader in the global nuclear energy market.

Stella Advanced Energy: Pioneering Africa's Nuclear Future

At the forefront of this nuclear renaissance in Africa is Stella Advanced Energy, a company dedicated to bringing Generation IV SMR technology, like the HTMR-100, to the continent and beyond, and providing energy as a service (EaaS) for the national grid and industry, Stella Advanced Energy is playing a crucial role in shaping Africa's energy future. Their work underscores the importance of indigenous expertise and innovation in tackling Africa's energy challenges and highlights the continent's potential to lead in the global shift towards clean, safe, and sustainable nuclear energy.

Conclusion: A Bright Future Powered by SMRs

Small Modular Reactors, particularly those utilizing thorium, represent a game-changing opportunity for Africa. By leveraging the continent's abundant natural resources and homegrown technological innovations, Africa can build a future where energy is abundant, affordable, and sustainable. The proliferation resistance of thorium and adherence to international treaties like Pelindaba ensures that this future is not only bright but also secure. As companies like Stratek Global, and Stella Advanced Energy, continue to push the boundaries of what is possible, Africa is poised to become a global leader in the nuclear energy sector, powering the continent and exporting its solutions to the world.

Dr Ugochukwu Ugbor is an accomplished knowledge management expert, business leader and entrepreneur, in energy and infrastructure. He has worked at the United Nations, in the Sustainable Energy for All programme. Dr Ugbor holds a PhD in knowledge management from the University of Technology, Vienna.

He has held senior positions at the International Atomic Energy Agency (IAEA), and the Organization of the Petroleum Exporting Countries (OPEC), where he developed a number of strategic programmatic initiatives and led implementation of major projects in several countries. Dr Ugbor has founded energy and infrastructure companies, with operations and business partners in Europe, Asia, Africa and the Caribbean. In 2009 he was an Adjunct Professor at the International University Vienna, and in 2008 was a Visiting Professor at the University of Applied Sciences Wiener Neustadt.

CONFIGURATION MANAGEMENT IN THE NUCLEAR ENERGY INDUSTRY: ENSURING SAFETY, RELIABILITY, TRACEABILITY, AND COMPLIANCE

ARNO OOSTHUIZEN

In the highly regulated and safety-critical nuclear energy industry, the integrity of systems, structures, and components (SSCs) is paramount. Configuration Management (CM) plays a crucial role in ensuring the correct design, construction, operation, and maintenance of nuclear facilities. This engineering process tracks and controls the physical and functional attributes of a system throughout its lifecycle, ensuring compliance with safety regulations and promoting operational reliability. Given the potential consequences of failure in nuclear facilities, proper configuration management is critical for preventing accidents and ensuring ongoing safety.

In the nuclear energy sector, Configuration Management is important not only for ensuring the efficiency of operations but also for achieving compliance with strict regulations set by national and international bodies, such as the National Nuclear Regulator (NNR) of South Africa and the International Atomic Energy Agency (IAEA). These regulations are designed to ensure the highest level of safety, environmental stewardship, and reliability in the use of nuclear technology and CM underwrites that.

Key Aspects of Configuration Management in Nuclear Energy

Safety

AS Safety is the foremost priority in the nuclear industry. Configuration Management is crucial for guaranteeing that systems operate as designed and that any changes to design or operations are carefully controlled, documented, and verified. Even the smallest deviations in equipment or operational procedures can lead to significant safety risks, including radioactive releases or system failures.

By maintaining accurate, up-to-date records of all SSCs, CM ensures that operators can identify potential vulnerabilities before they manifest into incidents. This level of control is critical in preventing catastrophic accidents like those seen in the past at Chernobyl or Fukushima, where lapses in safety management and design changes contributed to disastrous outcomes but also for less hazardous events affecting the efficient operation. Moreover, the IAEA has outlined a specific framework for ensuring that nuclear power plants adhere to safety standards globally. This framework includes guidance on establishing an effective configuration management system to maintain the integrity of SSCs throughout their lifecycle. In South Africa, the NNR enforces similar standards, requiring rigorous checks and balances to ensure that all plant modifications align with design specifications and safety standards.

Reliability

Reliability in the nuclear industry refers to the consistent and predictable performance of nuclear power plants. Configuration Management plays a vital role in maintaining this reliability by ensuring that any changes or modifications to equipment, systems, or procedures are evaluated for their potential impact on the overall operation.

For example, when maintenance teams replace a component in a reactor system, CM ensures that the replacement meets the original design specifications and performs equivalently. This process reduces the risk of unforeseen failures or breakdowns that could lead to plant shutdowns or, worse, safety incidents.

Through CM, nuclear plants maintain control over the many interdependent systems that contribute to the reliable generation of power. Comprehensive documentation of system performance, maintenance history, and configuration status ensures that operators have the information needed to predict and prevent equipment failures. This level of oversight directly supports operational efficiency, minimizes downtime, and contributes to the long-term sustainability of nuclear energy.

Traceability

Configuration Management is also essential for traceability, allowing operators to trace changes to nuclear systems back to their origin, identify the rationale behind each modification, and understand its implications for system performance. Every change made to a nuclear facility must be thoroughly documented, including details about the original configuration, why a change was made, who authorized it, and how it was implemented. This traceability is essential for ensuring that any future changes do not introduce unintended vulnerabilities. This is a CM function.

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In the nuclear sector, detailed traceability can be a lifesaver. For example, in the event of an anomaly, engineers can quicklyand accurately trace the problem to a specific change in configuration, allowing for targeted troubleshooting and rapid resolution. This traceability is also crucial for root cause analysis in post-incident investigations, enabling regulatory bodies and plant operators to prevent future occurrences.

Both the IAEA and the NNR emphasize the importance of traceability in nuclear operations. They require that all documentation related to changes in nuclear power plants be maintained for extended periods, often for the entire operational life of the plant, and even beyond decommissioning. This ensures that the full history of the plant's operation is available for review and audit at any time.

Compliance with IAEA and NNR Regulations

The nuclear industry is one of the most regulated industries in the world. Internationally, the IAEA provides comprehensive safety standards, guides, and requirements for nuclear power plant operations, including detailed guidance on the implementation of effective configuration management. These standards are designed to help countries build and maintain nuclear plants that meet global safety norms, prevent accidents, and respond effectively to emergencies.

In South Africa, the National Nuclear Regulator (NNR) works in close alignment with IAEA standards while enforcing its own national regulations. The NNR is responsible for licensing and overseeing all nuclear facilities in the country, ensuring that they operate within the legal framework designed to protect workers, the public, and the environment.

To meet these requirements, operators must have a robust Configuration Management System that tracks changes, ensures compliance, and demonstrates that any modifications adhere to safety standards.

The role of CM in regulatory compliance is twofold: it not only ensures that plants meet safety standards but also provides the documentation and records required for inspections and audits. This ensures transparency, accountability, and public trust in the nuclear industry.

Conclusion

In the nuclear energy industry, Configuration Management is a critical process that underpins safety, reliability, traceability, and regulatory compliance. Through stringent oversight of system changes, CM ensures that nuclear facilities operate safely and efficiently while adhering to the strict standards set by organizations like the IAEA and the National Nuclear Regulator of South Africa. Effective configuration management is key to the long-term sustainability of nuclear power as a safe, reliable, and low-carbon energy source.

Arno Oosthuizen is Configuration Management Specialist with over 14 years experience. He has been involved in the energy sector, nuclear medicine as well as design, manufacturing and defense. He holds a BEd FET degree from the university of Pretoria and is currently based in the United Arab Emirates.

N²A ASKED MARKS MAPONYANE, THE SOUTH AFRICAN SOCCER LEGEND, FOR HIS OPINION ON PROPOSED NUCLEAR EXPANSION PLANS. HERE IS HIS ANSWER:

MARKS MAPONYANE

I am really thrilled about the potential of the Nuclear Energy plant project that is underway in our beloved County.

We all know how loadshedding was a problem in South Africa and I'm using 'was' carefully because I'm not sure if we're out of the woods yet. The effects of loadshedding had serious repercussions on all of us, the economy, the students' studies and the traveling plans of families, amongst others.

The building of Nuclear Power Stations will help the country with adequate Reserve Energy, and allow economic advance, to benefit us all.
What does it require to achieve these milestones? The answer is; an effective team of men and women who work together with the same vision and commitment.

Just like in sports you need a combination of expertise to be a winning team, just think of the Springboks success. Was a young soccer player I used to think that a soccer team was eleven players. As I became older and wiser, I realised that you could not have a major Saturday game. At least somebody's prepared the grass on the field, somebody has drawn the white lines, somebody has sold the tickets, somebody has arranged the catering, and the list goes on. Then there are the coaches, doctors, dieticians, video analysts, media officers, amongst the many and all that forms the successful 'team' that we all know is essential for success.

So for any big project to be a success there'll always be lots of unsung heroes who together make it all possible.

A lot of money will needed for any big assignment, millions if not billions, but in the long run it will be worth the commitment and the dedication. Our country really has a chance to benefit from nuclear expansion.

Good luck to the Nuclear Team, I wish you all success in your endeavours. I am on your side.

Marks Maponyane is a legendary football player who has played for the South African national team. He is still the leading goal scorer of all time, of the Kaizer Chiefs' Club, having scored 85 goals, which is a record yet to be beaten, or even challenged.
Maponyane is the only player to have won Footballer of the Year three times.
Marks is now a well-known TV soccer commentator, and analyst.

DID YOU KNOW??

On the 5th September, 2024 the Emirates Nuclear Energy Corporation (ENEC) announced an historic milestone for the UAE when the fourth and final unit of the ***Barakah Nuclear Energy Plant*** *commenced commercial operations.*

This event marked the full delivery of the large nuclear power station and fulfils ENEC's promise to bring clean, abundant electricity to the UAE. The UAE stated that Barakah is one of the most successful new build nuclear projects in the past 30 years, representing a remarkable feat of engineering and teamwork, and a significant achievement for the nation.

The plant meets the highest standards of safety, security and transparency. An interesting observation is that there are about 160 South Africans working on the plant. The South African contingent has been there since the start of operations and have been proud to have contributed their nuclear expertise to the UAE in this great achievement.

The Barakah Plant is now generating 40TWh of electricity per year, which is approximately 25% of the UAE's electricity c demand. Barakah is producing almost the equivalent of the annual electricity consumption of New Zealand.

Nuclear technology is crucial in medicine

Particularly in imaging and cancer treatment. Radioisotopes are used in diagnostics (like PET scans) and in radiation therapy to target and destroy cancer cells.

NUCLEAR NETWORK AFRICA

THE WORLD OF NUCLEAR

Any person who has influence and a role to play in representing any Nuclear-Related Developments to advance nuclear power in Africa. or in any international entity, which can contribute to the development of Africa's nuclear energy capability is encouraged to be part of this great journey.

Any company, ranging in capability from a nut and bolt to the most sophisticated piece of equipment, should join the journey now.

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Submit your article or topic for consideration in our next N²A edition.

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