Nuclear Power Fundamentals

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Nuclear Power Fundamentals Training

(for technical and non-technical people)

Businesses, industry and persons that need to understand nuclear power, technology, financing, legalities and the application thereof in Africa and around the world.

Globally there has been a dramatic rise of nuclear inclusion in the energy mix from first world countries to those new to nuclear.

In October 2025, the South African government produced the Integrated Resource Plan 2025 (IRP2025). This is the guiding document for the development of electricity provision for South Africa over the coming number of years.

The IRP2025 document shows a significant move towards implementing more nuclear power. Nuclear to be implemented as both large nuclear, such as the existing Koeberg nuclear power station, but also working towards the implementation of Small Modular Reactors (SMRs), which is a much newer worldwide development.

This is a preparation course for anybody. It is structured in such a way that both technical and non-technical delegates can attend, (e.g., policy-makers, economists, communicators, and general managers) seeking a comprehensive, unbiased overview of nuclear energy.

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Course Outcomes:

- Fundamental understanding of what a nuclear reaction is
- Why uranium is required
- How a nuclear reactor works in principle
- Difference between large reactors like Koeberg, and the new generation of Small Modular Reactors
- Various other reactor concepts, eg. micro reactors
- Nuclear fuel and its importance
- Explain the case for nuclear power
- Critically evaluate common myths and fears regarding safety and waste
- Understand the global movement towards nuclear energy for sustainability
- Describe the transformative potential of Large Reactors and Small Modular Reactors (SMRs)

Training Schedule

- Two-days Training
- Daily from 08h00 to 16h00 with short breaks and a lunch hour
- Available as Hybrid training (attend in-class or livestreamed online)
- There is a voluntary test for a certificate of achievement. A test pass is required for the advanced training programme.

Course Overview:

The NPF course provides the foundational basics to understand the strategic, technological, societal, and policy aspects of nuclear power.

It covers the fundamental science, in a layman fashion but also addresses issues like; nuclear energy's role in sustainability, economic development, public perception, the waste story, and developing technologies like SMRs.

The NPF was developed to provide a platform for persons wishing to understand the context and controversies surrounding nuclear energy, helping them to confidently discuss its challenges and opportunities without needing a nuclear engineering background.

The training provides clear explanations of complex topics and contains dedicated sections to address public concerns and debunk common myths and fears about nuclear power.

Course Outline:

1. Basics and Global Context
2. Debunking myths and safety perception
3. How nuclear reactors work
4. What is nuclear reactor fuel
5. Waste management and economics
6. Why the public scare
7. The Future: SMRs and Innovation
8. Nuclear for Africa
9. Export Market

Meet your trainers:

Dr Kelvin Kemm

Dr Kelvin Kemm is a distinguished nuclear physicist and strategist with an extensive career advancing nuclear science and technology in South Africa and internationally. Holding a PhD in Nuclear Physics, he has played a pivotal role in shaping national energy policy and the strategic implementation of peaceful nuclear applications.

As former Chairman of the South African Nuclear Energy Corporation (NECSA), Dr Kemm provided leadership in research, reactor operations, and nuclear innovation. He has served on numerous scientific and advisory boards and is a respected voice in international nuclear energy discourse.

Renowned for bridging technical, economic, and policy perspectives, Dr Kemm remains a leading advocate for modern nuclear power's role in sustainable development and continues to educate and inspire professionals and the public alike.

Heather Veldhuis

Heather Veldhuis holds a bachelor's degree in Industrial Psychology and Sociology and is the Editor of N²A (Nuclear Network Africa) Digital Magazine.

A communications specialist with experience in professional development, training facilitation, and strategic communication, she brings valuable insight into how people and societies engage with complex technologies such as nuclear power.

Having successfully managed several private businesses, Heather understands the real-world challenges of the industrial sector. In the Nuclear Power Fundamentals Course, she contributes the human, psychological, and societal dimensions — connecting technical expertise with social understanding. Through her editorial work, she promotes informed dialogue and effective communication to advance public understanding of nuclear science and sustainable energy.