The Economic Imperative for Nuclear Power

By Ronald Stein, Dr. Robert Jeffrey & Olivia Vaughan

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Electricity from nuclear power sources is a necessity to ensure future balanced economic growth that is a lifeline out of poverty and instability for citizens in both developed and developing economies.

In an increasingly electricity-hungry world, nuclear power stands out as a cornerstone for sustainable economic growth, particularly for developing economies like South Africa. This article explores the economic rationale behind nuclear power adoption for electricity, emphasizing the Pebble Bed Modular Reactor (PBMR) and Small Modular Reactor (SMR) technologies as a catalyst for industrial and economic growth that is a lifeline out of poverty and instability.

Countries with fossil fuels should continue to use electricity available from High-Efficiency Low Emissions (HELE) coal, oil, and gas power sources in conjunction with nuclear power to achieve a balanced output and maximise economic growth. Drawing from detailed economic research performed over decades, we highlight why electricity from nuclear is essential for economic stability, job creation, and global competitiveness.

The Urgent Need for Reliable Electricity

In a world where reliable and sustainable electricity sources are crucial, poorer developing countries are spearheading the shift towards nuclear power. The transition to nuclear power generation is driven by the need for dependable, emissions-free electricity to meet the growing demand, particularly highlighted by the increasing requirements of data centres and AI globally. Both electricity and technology are vital for the inevitable transition towards more efficient human systems.

Electricity sources like solar and wind suffer from intermittency, requiring 100% backup capacity, which undermines their reliability. Nuclear power, however, offers a stable, dispatchable, and low-emission alternative, making it a critical component of a balanced electricity mix alongside High-Efficiency Low-Emissions (HELE) coal.

For South Africa, a nation battling unemployment (over 30%) and poverty (affecting 55% of its population), electricity choices are economic choices.

According to the latest Quarterly Labour Force Survey released by Statistics South Africa for Q1:2025, young people aged 15 to 34 make up roughly 50.2% of South Africa's working-age population, translating to approximately 20,9 million individuals. Within this cohort, the 15-24 age group—representing around 10,3 million individuals—face the highest barriers to entering the workforce, with unemployment figures significantly outpacing that of older youth.

The challenges facing young South Africans in the employment space are not new, but they are trending negatively in many cases. Over the past ten years, youth unemployment has remained persistently high.

The research reveals as a matter of fact, that nuclear power will drive industrial growth, particularly in electricity-intensive sectors like mining and manufacturing, which are vital to GDP.

By 2035, nuclear projects could contribute R39 billion annually to South Africa's GDP (0.6%), rising to R74 billion by 2045 (1.1%), highlighting its long-term economic potential.

Economic Trends and Global Context

On May 23, 2025, President Trump issued four executive orders as part of the administration's effort to quadruple U.S. nuclear generating capacity by 2050, promote deployment of advanced nuclear technologies, build out nuclear fuel supply chains, expedite the licensing process, and increase U.S. nuclear exports. The UK has also announced that Rolls Royce SMR has been chosen as the preferred bidder for the UK SMR expansion.

With the global shift towards cleaner technologies, nuclear power generated electricity is gaining market share as countries seek to decarbonize while ensuring electricity. For South Africa, this presents an opportunity to attract foreign direct investment (FDI), which is crucial for economic growth. A robust nuclear sector will reduce perceived investment risks, positioning the country as a leader in modular reactor technology, which is where it started. South Africa was the first country in the world to invest in the commercialization of SMRs and has invested substantially in decades of completed R&D, both through the government and within the private sector.

Globalization demands electricity solutions that are efficient, sustainable, and competitive. Nuclear generated electricity aligns with this trend, offering a reliable baseload power source with a minimal environmental footprint compared to other electricity generation technologies.

Sectoral analysis reveals that nuclear power supports key industries. Mining, contributing 8% to GDP, and manufacturing, at 13%, require consistent power that wind and solar cannot provide. Nuclear projects will stimulate related sectors, such

as construction and engineering, creating a multiplier effect across the economy that will, through ripple effects, catalyze prosperity and the much needed GDP growth in an economy struggling with 0,1% GPD growth and 0,2% population growth.

Policy Implications and Economic Significance

Effective electricity policies are pivotal. Pricing must reflect true costs, including environmental externalities, rather than relying on government subsidies that distort markets. Nuclear power's low operational costs and high efficiency offer a sustainable model where electricity generation can be accurately predicted over a long period, providing a springboard for truly sustainable economic growth. Moreover, it will significantly enhance the balance of payments, a chronic issue for South Africa due to its reliance on imported energy technologies.

By leveraging domestic uranium reserves and PBMR/SMR innovations like the HTMR-100, the country could reduce imports, projecting an annual surplus of R8 billion on the current account by 2045.

FDI and skills development are additional benefits, as nuclear projects require a skilled workforce, addressing South Africa's skills gap and fostering long-term economic resilience. The construction phase alone will create over 33,000 direct jobs and 154,000 indirect jobs within a decade, supporting over a million dependents through the dependency ratio.

Moving Forward for a Resilient Future

Most developing and emerging economies have a dilemma. On the one hand, there is intense global political and social pressure to limit their emissions of Carbon and Greenhouse gases (GHG); on the other hand, they face high unemployment and poverty levels. Every country needs to assess its economic and social needs.

Nuclear generated electricity, particularly SMR technology, is an economic imperative for South Africa, offering a reliable, cost-effective, and environmentally friendly solution. Its adoption will drive GDP growth, create jobs, and enhance economic sovereignty, setting the stage for a sustainable future.

Backed by rigorous analysis and expert insights, our report reveals a clear path to sustained economic growth and job creation through strategic investment in nuclear power, offering investors a stable, long-term opportunity in a sector poised to drive South Africa's electricity security and industrial competitiveness.

All countries need to pursue reliable, efficient, environmentally friendly electricity sources capable of generating and distributing dispatchable electricity to their industry and citizens. Nuclear generated electricity is undeniably the most reliable, cleanest and most sustainable way to do this.

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