



Exploring alternative sources of energy

South Africa has an energy-intensive economy, mainly due to the exploitation of the country's mineral resources. To date, mining and manufacturing processes have relied to a large extent on the cheap energy that is provided by the country's coal-fired power stations. However, this source of energy is non-renewable and needs to be replaced by the clean energy that can be provided by renewable resources such as wind, water and sun.

According to the Department of Energy, coal accounts for over 90% of the country's total electricity-generating capacity. In addition, about 95% of South Africa's population depends on coal to meet its energy needs. This has major environmental and economic implications.

The need for alternative sources of energy is compounded by the fact that there are no coal deposits in the country's western and eastern provinces, while such deposits have always been abundant in the north-eastern part of the country. The transmission of power from a single region leads to instabilities in the power grid, which is also a factor that needs to be urgently addressed.

Concerns about increases in the price of coal, the exhaustion of the country's reserves and global warming – partly as a result of greenhouse gas emissions and other atmospheric pollutants – necessitate a departure from the overreliance on electricity generated from coal. The global use of fossil fuel has been identified as one of the major causes of climate change. While the full consequences of climate change are unknown, what is certain is that neither the planet nor humanity will be able to adapt in time unless the process can be halted by developing and making use of new technologies to generate alternative and renewable sources of energy, such as nuclear, hydro-, wind and solar power.

This resulted in South Africa building its first nuclear power station in the Western Cape in the 1980s. Although nuclear power presently accounts for only about 6% of the electricity generated in the country, it is very important in an area where there are no coal reserves. South Africa also possesses sizeable uranium reserves and has an extensive uranium mining industry, making it one of the important producers of uranium in the

world. The presence of this primary source of energy in South Africa is a key element of the security of energy supply nationally.

Dr Rob Adam, CEO of the Nuclear Energy Corporation of South Africa (NECSA), was the invited speaker at the annual Hendrik van der Bijl memorial lecture of the South African Academy of Engineering (SAAE) that was presented at the University of Pretoria on 1 June 2011. The theme of his address was the future role of nuclear technology in South Africa. He emphasised the fact that investment in nuclear power would go a long way in easing South Africa's energy crisis.

The Integrated Resource Plan (IRP) of 2010 of the Department of Energy, promulgated on 6 May 2011, forms the basis for South Africa's electricity generation mix going forward for an overall period of another 20 years. This plan is informed by the need to diversify the energy mix, with specific emphasis on broadening electricity supply technologies to include gas, imports, nuclear, biomass, and renewables (wind, solar and hydropower) in response to both the country's future electricity needs and to fulfil its commitment to reducing CO₂ emissions.

In terms of the IRP of 2010, demand for electricity in the country is expected to increase to about 454 TWh in 2030, compared to 260 TWh in 2010. It anticipates that 22.6% or 9.6 GW of the country's electricity generation capacity will be derived from nuclear power. Government has therefore given its support and commitment to nuclear power as a viable option for low-carbon, base-load electricity generation. The South African nuclear programme will be one of the largest programmes ever undertaken in this country, and the government has clearly indicated the importance of industrialisation and localisation of certain nuclear capabilities.

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